

Thesis for PhD in Art and Design (Art History)

Architectural Crafts of Shīsh Maḥal Complex, Lahore Fort

Submitted by

Muhammad Zeshan Ashraf

Research Supervisor

Prof. Dr. Shaukat Mahmood *S.I*

M.A. Fine Arts University of the Punjab, Lahore
M.Sc. Environmental and Architectural Conservation
Herriot-Watt University, Edinburgh, U.K
PhD Islamic Architecture
University of Edinburgh, U.K
Professor, College of Art and Design
University of the Punjab, Lahore.

Prof. Dr. Sumera Jawad

Principal, College of Art and Design
University of the Punjab, Lahore.

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**Research Centre
University College of Art and Design
University of the Punjab
Allama Iqbal Campus, Lahore.**

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Muhammad Zeshan Ashraf

**UNIVERSITY COLLEGE OF ART AND DESIGN
UNIVERSITY OF PUNJAB
ALLAMA IQBAL CAMPUS
LAHORE**

Dedication

To my parents who endowed me with the spirit of honesty.

Declaration

This thesis is my original work, executed through the research carried out during the tenure of PhD under the supervision of Prof. Dr. Shaukat Mahmood, *s.l* Research Centre, University College of Art & Design, University of the Punjab, Lahore.

Muhammad Zeshan Ashraf

Certificate of Approval

This is to certify that this research work is the original work of Muhammad Zeshan Ashraf, Assistant Professor of Architecture, College of Art and Design. This research has been carried out under my direct supervision. I have personally gone through all the data and certify its correctness and authenticity. I further certify that the material included in this thesis has not been used in part or full in a manuscript already submitted or in the process of submission in partial/complete fulfillment of the award of any other degree from any other institution. I endorse its evaluation for the partial fulfillment of the award of PhD Degree through official procedure of the University.

Prof. Dr. Shaukat Mahmood, S.I.
Research Supervisor

Certificate of Approval

This is to certify that this research work is the original work of Muhammad Zeshan Ashraf, Assistant Professor of Architecture, College of Art and Design. This research has been carried out under my direct supervision. I have personally gone through all the data and certify its correctness and authenticity. I further certify that the material included in this thesis has not been used in part or full in a manuscript already submitted or in the process of submission in partial/complete fulfillment of the award of any other degree from any other institution. I endorse its evaluation for the partial fulfillment of the award of PhD Degree through official procedure of the University.

Prof. Dr. Sumera Jawad
Second Supervisor

Abstract

Lahore is an ancient city covered with rich civilization and cultural context. There are several researches and studies that explain the origin of the city. As Alexander 4th Century B.C and famous Buddhist Chinese Pilgrim Hieun-Tsang 7th Century A.D visited the city. It was ruled by numerous cultures and emperors till the Mughal Era. The Mughals contributed to the architecture of the city and provided beautiful forts, palaces, tombs, and gardens.

The analysis of the Mughal architectural arts, and Crafts are initiated by studying each element, which is the only way to have genuine interpretations of creativity. The domains of Mughal architectural crafts are focused in this study where, in pursuit of understanding this arts and crafts, an overview of the Mughal period crafts and phases of architecture are discussed, which help to elaborate the old and modern techniques used by the craftsmen to create beautiful architectural ornamentations.

When interpreting the term, Mughal architectural arts and craft elements, beauty cannot be subtracted from it. The thesis statement allows the researcher to understand its origin, transitional phases, and importance in Mughal architecture. Most of these architectural elements started by Mughal emperor Shāhjahān, known as architect king. He adopted numerous techniques from different empires, as *Pietra-dura* was the invention of Italian craftsmen. Shāhjahān practiced in Palaces, forts, mosques, and other luxurious buildings.

The techniques used in the architectural crafts belong to ancient time period, but all of them are still practiced with the modern equipment's as well as its ancient and traditional tools. Modern machinery allows to create an architectural craft in less time as it was created in the past. There is no major difference between the architectural elements created with traditional tools and those created with the help of modern tools. But with the passage of time, the craftsmen were not found abundantly. They are less in number and working in a small sector to create limited elements for export. These crafts became expensive over time, due to low demand. As a result, these architectural crafts became out of the reach for general public. Hence not used nowadays, to decorate the buildings of the modern period.

The whole discourse aimed to standardize the techniques and observation of the Mughal architectural crafts, apparently quite hard to attain but generally viewed to

analyze the process of all elements. It proves the hypothesis that the architectural crafts of the Mughal period can be created in modern times with the help of modern tools and machinery. For this reason, researcher followed qualitative approach to collect data from primary and secondary sources through In-depth interviews of craftsmen and experts, in order to understand traditional techniques and their comparison with modern techniques for revival and restoration of architectural crafts.

The study concluded that machines could bring accuracy in work but deprived them of the feeling that a craftsman incorporate which brings true essence to these crafts. We need to keep this feel in our crafts alive to connect our future generations with glorious past.

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Introduction

The original ancient city of Lahore is a culturally rich civilization which is still covered in mystery. Besides numerous studies and researches, its basic origin and transformation is unknown. Only a few of these studies enlightens the early phases of this historic city, like in 4th century B.C Alexander visited this city and in the 7th century A.D Chinese pilgrim Hieun-Tsang paid a visit to this area. But original archeological data available only entrenches the city between Lahore Fort and Ḥavelī Dhayān Singh in Bāzār Sa'īd Miṭha. However, the history of Lahore can be divided into six or seven major reigns, which define the destiny of cultural history, art, craft, and life pattern of people. (Dar 2010).

As for the Pre-Islamic period, the first datable reference for the city of Lahore is from 7th century which appears to have grown into a sizeable town by the 10th century. According to an author at that time this city was full of markets, idol temples, fruit gardens of pine, almonds and coconut trees. (Dar 2010).

As per Sultanate period, 1014-1625 A.D not enough has been saved for cultural history in terms of art and craft because of massive turmoil in the above-mentioned time period. In Ghaznavid time Lahore was considered to be one of the three top most famous Islamic cities (next to Baghdad and Ghazni). It was, fortunately, the first city to issue bilingual coin along with credit to be crowning city of the first regular Muslim emperor of India, Qutb-al-Dīn Aibak, on 25th June 1206. The first-ever royal mausoleum was also built in this historical city in the history of the Sub-Continent. After Ghaznavid rule, Ghauri 1186-1206 A.D and slave 1206-1290 A.D dynasty Lahore was used as cushion against Mongol invaders, who devastated the city for 30 years, in short towards the end of 14th century A.D Lahore again suffers massive turmoil due to which the original socio-economic and cultural life of a citizen of Lahore belonging to this era remained faded and shrouded. The only monumental inscription Khatt-Naskh “now preserved in Lahore Museum” once fitted on the grave of Pīr Bālkī in Kaṣhmīrī Bāzār gives an insight to their cultural aspects.

The magical and mystical era in the history of Lahore starts with the establishment of Mughals in India 1525-1760 A.D. During this era, Lahore got a few centuries of peace and prosperity, which leads to its reputation as a center of

excellence for scholar-saints, sophists, merchants, traders, and students. Akbar made it a resort for people of all nations and center of excessive commerce.

Akbar was the emperor who enclosed the city with burnt brick wall and magnificent gates. As Lahore was the birthplace of Shāhjahān, it was very close to his heart, and during his 30-year reign, he bestowed the city with magnificent building, gardens, ḥammāms, palaces and Sarā' ai. As of Lahore Fort, he brought numerous changes along with newer editions at various parts. Starting with the northern and western walls, 8000 Square Yard of glazed surface with endless array of colorful floral panels reviving the folk life of the time. It was him who added muthamman burj (Shīsh Maḥal) the most prestigious part of the fort along with Shāh Burj and Naulakha pavilion in 1631 A.D, Khāwabgāh-i Shāhjahāni, Ḥammam-i Shahi, Khilwat Khāna and Dīwān-i Khās (Dar 2010).

Crafts in Mughal Era

The Mughal period was referred to as the golden period of arts and crafts; during their era, architectural crafts, in particular, were reached their zenith. The Mughal era was a gourmet of eastern architecture in the history of South Asia, no matter what, the building material was, stone or brick they carved in perfection and brought out the crafts to a level which could fulfill their esthetic, artistic, and architectural sense.

The interior of all such buildings were embellished with fresco painting displaying a rich array of floral, geometrical motifs and calligraphies in Kūf īc, Naskh, and Nastālīq styles as well as arabesque design. These patterns in varied forms and glowing colors, well suited the arches, spandrels, squares, rectangles, as well as circular spaces and undersides of domes. The exteriors of the brick building were also decorated with glazed tiles and mosaic with a special technique only known to the craftsmen of Lahore. Floors were with diaper patterns with brick-on-edge technique. The open wall surface was covered with tāzākāri or brick imitation work. In the case of stone buildings, the rich owners could afford to decorate them with *Pietra-dura*, the most delicate and expensive of all the architectural craft. Besides, the walls, parapets, fences of tanks and thrones were fitted with exquisitely delicate trellis frames cut in white marble. Stone inlay or intarsia was also commonly used. At times, stone carvings including animal and bird figures are also met with. Wood carving was the most common form of architectural decoration for several carved doors, windows,

and balconies, eaves, brackets, and columns. Moreover, *sihdarās* with exquisite carving inlay and overlay works have survived. Three carved doors of the period of Akbar are on display in Lahore Museum. (Dar 2010, 58).

As the architectural activities were at its peak in this era, it attracted various architects, masons, stone carvers, tile makers, *naqqāsh* and calligraphers from all over the world especially from Iran, central Asia and rest of the parts of India not to forget that these architectural activities gave birth to a new and rare craft which was introduced in Lahore and later spread worldwide known as *ā'inākārī* (mirror work). Carved and rubbed brick work was also observed in buildings of this era.

Shīsh Maḥal Complex

Shīsh Maḥal gives an insight into the architectural excellence of the seventeenth century. This part of the fort has originated during the reign of Emperor Shāhjahān though the addition by Sikh is also observable.

Fore court, to give a start, the grand arched gateway of Shīsh Maḥal stands magnificently in the shape of ornate vestibule. The inner side of this gateway is decorated with panels of fresco. Next to it comes the courtyard, which now consists of terraced flooring, but there are sufficient indications that confirm the presence of a small garden instead. Before the Sikhs overtook the area, in the center, there was a big shallow tank with fountain, then walkways which were symmetrically arranged (see figure 1).

The most ornate part of the royal palace is Shīsh Maḥal. This part was created by Emperor Shāhjahān for his beloved wife *Mūmtāz Maḥal* (*The lady of Tāj*) as she was buried in *Tāj Maḥal*, one of the wonders of the world, which was also built by the same emperor for the love of his life. (Nadiem, LAHORE A Glorious Heritage 1996).

The Shīsh Maḥal is the complex collection of series of *dālāns*¹ porticos as pavilions arranged side by side all along with the courtyard. The square of the courtyard is divided into four parts by four shallow water channels. These channels connect in the middle to a *mihtābi*² or square platform, around which four fountain jets are present opposite to each corner. The whole space, including *mihtābi* and tank, has been paved with variegated marble.

¹ Veranda or open hall for reception

² Platform

The main building of Shīsh Maḥal, or the palace of mirrors, occupies the north region of the square courtyard. The longer side of this square consists of a row of five double pillars; these pillars are generously decorated with delicately inlaid marble forming five archways cove by the same material. The spandrels over the arches and bases of the double columns of white marble are decorated with beautiful *Pietra-dura*. The main hall, rectangular in shape and having considerable dimensions, has a dado of white marble. The upper portion of the walls and the ceiling are embellished with an extensive mosaic of glass laid in gypsum, which indeed has given it the most appropriate name of Shīsh Maḥal, through the court chronicler Mullah Abdul Hamid Lāhāuri mention it just as īwān or Hall.

The mirror decoration of the hall clearly seems to belong to two periods. The ceiling with its prevailing aspect of subdued gilt and balanced style, undoubtedly makes it a part of the work done in the Mughal era. The wall decoration being gaudy and having the childish admixture of blue and white china must take its origin to the Sikhs.

The mirror work on the walls fell off on peeling at a few places, clearly showed the coarse paintings, also belonging to the Sikh period. Some of these paintings, still preserved, are based on themes from Hindu mythology.

The roof of the Hall of Mirrors is suspended from the wooden beams and rafters. Some of these beams showing decay were changed in the early part of the twentieth century and then in the late 1980s. These conservation measures and the aging process put together have affected the building strength of the gypsum base, further weakening the glass work at the ceiling.

The central hall of Shīsh Maḥal is surrounded by a row of nine rooms on three sides of it which are decorated in the same theme. The largest among these rooms is the middle one at the back of the main hall which consists of a very fine marble Jālī .

Over above the of Shāhjahān's Shīsh Maḥal lies the heavy, clumsy rooms built by Sikhs in extremely dilapidated conditions due to negligence and disrepair. A part of this structure was removed in the early 20th century to take of the dead weight. The only remaining part over the eastern side still mars, the beauty of this palace.

The middle of western extremity court occupies an open pavilion, refers to as Noulakha pavilion, the name refers to its cost as its construction and ornamentation cost almost nine lack rupees, but it is not confirmed according to some sources. As the

emperor Shāhjahān built this graceful pavilion for the comfort of his beloved wife, it has a simple oblong yet magnificent structure having a single arch opening in front and relatively smaller flat opening on each side. At the rear, this has a central archway flanked by smaller oblong opening filled with carved marble brackets. (S. M. Latif 1994).

The interior of the Naulakha has been lime-plastered and, in turn, treated with frescoes. The walls up to dado level are riveted with marble panels delicate and very fine *Pietra-dura* work.

Fortunately, this part of Lahore Fort was not mutilated or destroyed by Sikhs at a scale witness in other buildings of the Mughal period. However, they added much part which did not match the marvelous and graceful architecture of Mughals. This mellow behavior must have been due to Māhārāja Ranjit Singh, who has his favors and taste for this complex.

Many different forms of architectural crafts are used in Lahore Fort due to its construction in different eras. Every emperor has his own taste, which the constructed part depicts. Out of this, Shīsh Maḥal has the most refined and precious collection of architectural crafts due to supreme taste of Emperor Shāhjahān. In this part, the craft work is very valuable in terms of craftsman ship due to every craft carved in a precise manner.

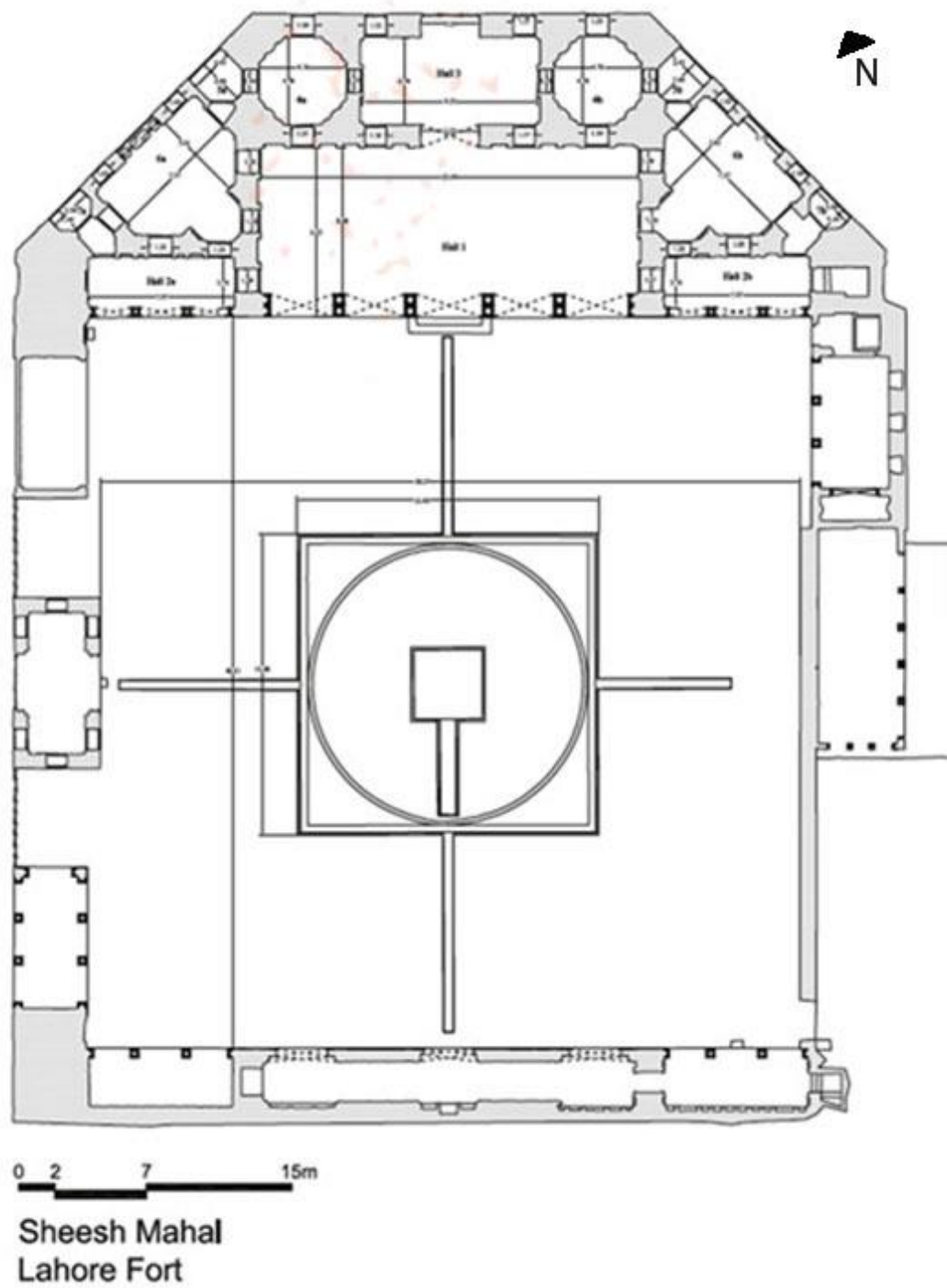


Figure 1 Plan of Shīsh Maḥal Complex Lahore Fort. Prepared by Archeology Department.

Literature Review

Rohita Sharma and Ila Gupta, in 2012, wrote a research paper titled “Mughal Seed in Modern Architectural Decoration” which tried to find enriching and aesthetic values for the use of different crafts and motifs for wall beautification in the contemporary period. The lifestyle of Mughals and their glorious architecture with its exclusive decoration is well known. The architectural crafts imitate their supreme taste, living style, and Mughal’s customs. These monuments are famous throughout the world for their wall ornamentation. Stone Inlay, wall paintings and stucco embellishment in the Mughal era are unique. The Mughals brought new techniques and introduced beautiful colors to the area. The objective of the study has an improved perception of Mughal arts and crafts. The study concludes that the mural decoration in the current time has its root from the Mughal period. (Rohita Sharma, Ila Gupta 2012).

Abdul Rehman and Munazzah Akhtar reviewed Mughal architecture in the light of key sources. Every design of the Mughal building surpassed its antecedent in its design expressions, quality, and ornamental details. From the selection of the site to the final design, Mughals constantly experimented in art and architectural design, resulting in highly refined structures. This research paper discusses the form, composition, and practical use of architecture in the Mughal period. This research also highlights the diversity of expertise and facts, which Mughal architects possessed, identification to the finalization of structure designs and its minutest particulars. (Abdul Rehman, Munazzah Akhtar 2012).

Krupali Uplekar Krusche, Danny Aijian 2010 investigated the history, morphology, and perfect proportions of Mughal tombs: the secret to the creation of Tāj Maḥal in terms of eastern architectural language. Traditional Islamic or Mughal architecture has influenced the developmental growth and linkage of Mughal tombs. This study presents its research with emphasis on the precision of spatial uniqueness on four Mughal tombs in India along with laying stress on unfolding a better understanding of western architecture. This research also explains the progression of Tāj Maḥal with steadily indulgent on grounds architectural rules and composition of Mughal culture, developed through the revival phase in the east (1508 to 1707 A.D). (Krupali Uplekar, Krusche Danny Aijian, Selena Anders, 2010).

Shamsuzzoha and Hamidul reviewed structure, decoration, and material in Mughal mosques of medieval Dhaka. Muslim architecture has been initiated from the very beginning of Islamic heritage, starting with the mosque, introduced by Prophet Muḥammad (P.B.U.H). Later, this architecture was introduced into India at the beginning of the 13th century. Certainly, structure-related ideas, materials, and its function had a vital role in that period. According to the researcher, the Mughal mosques of Dhaka are the exclusive paradigm of architecture where the ideas and materials used have been effectively combined in the context of Bengal. This study is an effort to scrutinize the structure, decoration element, and specific materials of medieval Mughal mosques of Dhaka. Their study also analyzes exclusive interior and peripheral configuration and design of the mosques. (A.T.M. Shamsuzzoha, Hamidul Islam 2011).

Carla M. Sinopoli wrote Mughals were the heirs of more than half-millennium long tradition of central Asia. Babur, the first Mughal captor, had descent from both Timūr and Changīz Khān. Central Asian traditions were seen everywhere in Mughal military strategies, political configuration, and municipal forms. However, the innovative management during the Mughal period developed new organizational reforms that were distinctively South Asian. This leads to the creative manipulation of indigenous Muslim and Hindu traditions. This paper focuses on the form, division, and representative content of Mughal capitals, visualizing many sources of Mughal history and culture. (M. Sinopoli 1994).

Devika Singh approached the research about “Mughal Past in Indian Art Criticism.” Her research paper examines the architecture of the Mughal period in MARG, which was the leading art journal of 1940s and 1950s India. This study combines some of the explanations of Indian art history and the role of precise art historians, including European exiles who were also contributors to the journal. (Singh 2012).

Ebba Koch studied Mughal imperial architecture from 1526 to 1858 and its links to central Asia, including Iran and the west. As India had the Mughal dynasty from the 16th to the 18th centuries having descendants of Changīz Khān and Tamerlane. As a new dynasty ruling over a vast region of peoples of diverse creeds and cultures, the Mughals declared universal rule in a multi-cultural perspective. They were extremely conscious of the impending use of architecture for self-representation. To articulate their 'multiple distinctiveness' architecturally, they drew from many

various supra-regional and regional traditions, a few of which they amalgamated and 'imperialized' successfully. (Koch 1993).

James L. and Wescoat Jr studied Mughal Gardens in terms of re-emergence of relative possibilities and the dithering of practical concern. According to them the Mughal gardens are the tradition that has its roots from Central Asia and extends to South Asia during the Mughal reign, is now facing intellectual and convenient challenges that put up heavily upon its future. Their study identifies and tackles these challenges by putting Mughal Garden history in a comparative framework, reviewing developments in associated fields of Islamic garden studies, and by evaluating the place of Mughal gardens in extensive fields of chronological and practical analysis. (Wescoat 1999)

Rationale

Every craft has a history that defines its particular area, culture, and customs of society. Some of these customs change with time, along with people's taste, giving birth to new traditions leading to the era of new art and craft, thus creating a decline or lack of interest towards older art and craft. This decline is attributed to the craftsman changing their profession due to lesser earnings leading to the death of older craftsmanship and skills. These things altogether bring a change in the tradition/area's local art and craft.

However, Architectural craft is a fixed entity that moves from generation to generation till the building or monument having that specific craft exists, such as Mughal art and craft in Shīsh Maḥal Lahore Fort.

The intense techniques, excellence in skills, time taken procedure and, massive expenses required by Mughal architectural craft used in Shīsh Maḥal is leading to the death of our traditional identity. This research intends to revive this traditional architectural craft in contemporary architecture so that this region's (subcontinent) golden period can be moved on to the upcoming generation.

Objectives

The architectural craft in Shīsh Maḥal appears as the miraculous essence of the craft, which includes the highly delicate work of stone latticework, *Pietra-dura*, tessellated floor, stone inlay, mirror mosaic work, stucco, and fresco in its expressions. All above work on their own level needs thorough consideration for their protection being the cultural heritage building. The research, however, focuses on the

preservation of craft techniques which are still at vernacular level, and it is the need of time to think and use the scientific conservation techniques in the present time for its preservation. The key objectives of this research are:

- To identify the process and original techniques of crafts as they were prepared in the Mughal period.
- To review the effect of different eras on the process and techniques of crafts in Shīsh Maḥal.
- To identify the effects of advanced technologies on the quality of crafts and material.
- To review Preservation of original essence of craft through modern techniques.
- To explore the possibility of revival of these crafts with their original essence in contemporary architecture of the time.

Research Question

The splendid quality of architectural craft developed at Shīsh Maḥal Lahore Fort (Shāhjahān's period), can we create the same master pieces utilizing advance techniques for revival and restoration of these crafts?

Significance of Study

The study of architectural craft in the present time with reference to the past techniques unfolds the various questions for consideration. The dyeing craft art appears before the world, particularly in the subcontinent, as unique and mature in its aesthetic expressions. Its preservation and care demand the deep insight to restore and visualize the crafts in this modern era. Modern techniques involving vernacular style bring in the light for the revival of architectural crafts, as can be seen in Shīsh Maḥal Complex Lahore Fort.

The main purpose of the study is to provide awareness and deep knowledge for the students and upcoming generations so that they could keep a connection with roots of this region. The implications of this study could also contribute to national interest by improving tourism and jobs in conservation/archeology sector. This whole expression can only be perceived when the concept of revivalism becomes a part of our thoughts. Moreover, the results of this study can help field of heritage, through

introducing ways to improve their work output, by merging the newer techniques with older ones without compromising the aesthetic effects.

Research Design and Methodology

This study focuses on the “Architectural craft of Shīsh Maḥal Complex of Lahore Fort. This research study indicates the process to collect data and its analysis as well as evaluation. It also refers to the rational combination of methodologies to collect that research data and evaluate for the results and the conclusion. Bowling (2002) writes, “methodology is the complete structure of the research study; the size and sample methods, the practices and techniques utilized to collect data and the process to analyze data” (All Answers Ltd 2018).

This is a basic principle for the research design, philosophy, and content following the study. It characterizes the methodology of the researcher while recoding data from collected information and its evaluation. Furthermore, it also ensures scholarly principles and structures required to be present in a research study, to make it deemed a scientific paper, with specific effects on the research field.

Consequently, it is an illustrative form of a research study. In this type of research, work data is collected through different methods like in-depth interviews, surveys, and on-site observations etc.

Turabian style 6th edition is used for citation. All figures sources are mentioned except those taken by the author or basic tools/process photographs. Islamic encyclopedia transliteration system is used with little variations.

Qualitative Method

A qualitative method refers to classification of the data with discussions and multidimensional evaluation that is not characterized in statistical forms, rather in an explanatory way. For this research, the qualitative analysis of the data was accomplished by creating several headings and categories to prepare the conclusions. The methods applied for this study included in-depth interviews and observation method.

In-depth Interviews

In qualitative research, an in-depth interview is the most effective method for data collection in which the study seeks data from the respondents directly. It plays a

significant part in reaching out for the opinion, perceptions, knowledge, and experiences of the defined population in a particular study. An interview is always with a goal orientation in hand. It serves the researcher in the most suitable way while looking for opinionated data. (Showkat and Parveen 2017)

The interview follows a certain format. This format is defined depending upon the objectives, research questions and purpose of the research to be conducted. An interview can be structured, semi-structured or unstructured. The interview in which the researcher follows a pre-planned questionnaire is called structured, while the one with no pre-defined questions is called an unstructured interview. For this research, the researcher went for the structured interview with a planned questionnaire in hand.

The interview is considered one of the most important qualitative research methods. It is generally a technique to collect data from the experts by engaging them in an intensive and thorough interview. The target audience is actually the defined population of the particular research that is being conducted. To conduct intensive interview a limited number of respondents are defined based on the certain properties that can provide the researcher with a most appropriate form of desired information. The purpose of conducting in-depth interview is to explore the stance and perception of the defined sample of the experts. As the interview gives an intensive approach of the respondents regarding a particular topic, issue or problem, it is an effective qualitative method.

In-depth interview as a research method is effective when a researcher is interested to know complete information about the personal viewpoint of the individual on the topic he/she is dealing with. For this purpose, the questions of the interview are designed so that the researcher can have maximum information regarding the personal stance of the individual about the issue in hand. The foremost advantage of the in-depth interview over other methods is that it provides more intensive and detailed information; for example, it provides more in-depth data than collected by the surveys etc. Most of the researchers found that in-depth interviews provide a more suitable situation for the respondents to share information than filling a questionnaire. (Boyce and Neale 2006)

Planning in-depth Interviews

The conduct in-depth interviews, careful planning is done. For this research, the researcher followed the following important steps to plan and later conduct it with the defined respondents.

1. Planning

1. The information to be collected was identified by the researcher.
2. The respondents were defined by the researcher.
3. The questionnaire for the interview was prepared.
4. Define a plan to conduct interviews.
5. Reaching out for the respondents for the appointments

2. Instrumentation

Developing instruments is an important stage while preparing for an in-depth interview. The researcher needs to define a certain set of rules or construct an “interview protocol.” The researcher considered questions like how to get an appointment with the interviewees, location of the interview to be conducted, to ensure the credibility of the data provided by the respondents. At the same time, other questions like how to begin the interview and how to end it was also considered by the researcher while developing the instruments of the interview. Formation of the questionnaire was also done at this stage. Most of the time set of rules are also derived for the interview so that any complication can be avoided by following such rules. Norms and other value-based things are also defined at this stage.

3. Data Collection or the Execution

At this level, interview was finally conducted by the researcher. The respondents were reached out at the appropriate location of the interview. Punctuality was given importance in the whole process. The key data collected from the interviews were summarized accordingly.

4. Data Analysis

This is an important stage when all the collected data is exposed to analysis. After conducting interviews, the collected data was analyzed by the researcher in accordance with the research questions and objectives of the study defined by the researcher. The analysis of the data helped the researcher to give findings and draw

conclusions. The important thing is that analysis should be objective, and any subjectivity in the analysis can make the whole research a biased and ineffective one. Thus, the analysis that is unbiased is the key to effective research.

Population of the Study

In research, the population is known as the compilation of subjects or individuals that a study concentrates. Population is the total sum of all the specific participants that have all the necessary properties which are consistent with the objectives of the study. Usually, it comprises all the persons of specific classification or the element of that category (Gary, 1987).

A population is well-defined by the researcher that is related to the study, which needs to be conducted. Such a population is deemed by the researcher and can accomplish the aims and objectives of the research. It is always characterized by its relevancy with the proposed research. It has two types that are sample-population and target-population. A sampled population or target population for research is defined according to the conditions. The target population is suitable to concern the scholar, and its properties are likely to be generalized. On the other side, a sampled population is from which a sample is originated. The generalization of the conclusion and results of sampled population varies its consistency and other methods of information.

For this research work, aiming “Architectural Crafts of Shīsh Maḥal Complex Lahore Fort, population defined by the researcher, is of experts in Lahore, having expertise in various categories of architectural crafts with particular knowledge about different aspects of Mughal architecture.

Sample of the Study

For the research work to be achievable, a sample population is taken as a brief reflection of its complete population. As a large amount of population is not feasible to be accessed by the scholar so a more reasonable and accessible way is derived out of it. Thus, a subset of population is a sample. A sample is a description of the whole population in a form that signifies all the physical characteristics that can be observed in the total population under study. Sample being the subset of the population inclines all the data that all population, from which the sample is originated, in the specific study.

Thus, a sample is taken from the population instead of studying the whole population for the data collection. This origin of sample is not subjective to the scholar rather, in research work, it follows several methods to derive a proper sample out of the specified population. To have a sample that signifies all the data of the population-specific sampling methods are used. Some of the methods would be random-sampling, systematic-random, purposive-sampling, sampling stratified-sampling, and snowball-sampling.

Sampling Method

Taherdoost (2016) noted that “Since researchers neither have the time nor the resources to analyze the entire population, so they apply sampling technique to reduce the number of cases.” For applying the sampling method, there is required a well-defined set of population that can be reduced in terms of a number of cases and confined to a smaller group called the sample (Taherdoost 2016).

In order to draw a sample out of the defined population of the study, different sampling methods are adopted by the researcher. Broad sampling methods are divided into two types i.e., the probability sampling method and the other non-probability methods. In research, Probability sampling includes sampling techniques, or methods in which every single individual of the whole population has equal chance (probability) to be nominated in the sample. On the other hand, non-probability sampling is attributed to those sampling methods where every individual or object in the entire population of the study does not have an equal chance to be selected or considered in the sample. Both probability and non-probability sampling methods can be divided into further sampling methods that are considered in the research by the researcher according to the requirements.

For this study, the researcher has preferred the convenience sampling method to draw the sample out of the defined population of the study.

Convenience Sampling

In convenience sampling, the participants chosen are “often readily and easily available.” Generally, convenience sampling is preferred by the researchers as most favored sampling method for being a cheap and trouble-free choice as compared to the other related techniques used for sampling. Among other benefits of opting for convenience sampling, it favors the researcher to deal with certain restrictions coupled

with research. For instance, considering using familiar people like friends, classmates or family as a sample of the study proves to be more favorable than considering other unfamiliar people with the same properties of interest required for the research (Taherdoost 2016).

The convenience sampling method is a non-probability sampling method. In this method, the sample is drawn from that part of the population that is conveniently available or is close to hand. Lavrakas (2008) noted that "Convenience sampling is a type of non-probability sampling in which people are sampled simply because they are convenient sources of data for researchers." Each member in the sample is selected from the population with the random selection method. Thus, in this sampling method a subjective approach of the researcher also plays important role while drawing a sample from the population. Unlike purposive sampling (also a type of non-probability sampling) it does not follow the expert judgment for defining the sample (Lavrakas 2008).

For this research, the researcher chooses ten craftsmen that were suitably available to him. As the population of the study included all the experts with related expertise in architecture, particularly in Mughal architecture, the researcher went for those experts available more accessibly. Thus, this sampling method allowed the researcher to draw a sample out of the large population that was feasible to be reached to conduct in-depth interviews.

Observation Method

The second method adopted by the researcher to conduct this research was the observation method. Observation can be witnessed as the most basic interaction of routine social life. Through this observatory interaction, important information is collected by the observer about the phenomenon being observed. Other than that, observation is also considered among the most significant method in research. It is a simple method of data collection in research as well as the complex one. It can serve as the major method in a research project or can play its part as one of the other methods used in particular research. It means that observation method is such a useful method that it can serve as the sole method to provide the researcher with all required data of interest.

Marshall and Rossman define observation as "the systematic description of events, behaviors, and artifacts in the social setting chosen for study". The observation

method helps the researcher to illustrate the particular situation by using five senses (Kawulich 2005).

Generally, the observation method involves the collection of the data where defined sample is observed by the researcher instead of directly asking for a particular response or piece of information. The observation can both be quantitative or qualitative.

Personal Observation Method

While personal observation method is the subcategory of the observation method. In personal observation technique, the researcher plays the role of the prime instrument to observe, monitor, and collection of data. This type of observation i.e., personal observation is widely used in “ethnography; the study of human races and cultures.” The personal observation may follow the data collection methods that are explicit and implicit in nature. It can be participatory or non-participatory. Price and Linda noted that

“Participant observation is a systemic recording and analysis of information gained while engaged in and observing activities, rituals, interactions, and events in order to uncover explicit and tacit aspects of the field of study.”

While taking personal observation as a method in research, it gives rise to certain queries for the researcher to deal with. These questions may include establishing limitations for the level of participation, looking for the formation of a suitable blend of both observation and participation of the observer (researcher in this case), and ensuring the privacy of the source of information or observation.

For this research, the researcher used both qualitative and quantitative observation methods to collect the required data of interest.

Purpose of Observation

In research observation method is a technique that uses systematic means to collect data. In the observation method, the researcher uses observation abilities through all senses to inspect people, events, behaviors, natural occurrences, objects, and other observable phenomenon. On the other hand, observation in a field setting may include extended engagement in the defined environment, setting or a particular situation. To collect the most appropriate or actual data, this prolonged and extended

form of engagement is necessary. On the other hand, the authenticity and credibility of the observed data can be questioned.

For this research, the researcher has been engaged with observing the Lahore Fort for 15 days to have the data to be more relevant.

Field Notes

In the observation method, field notes play a significant role in making the whole observatory activity an effective one. Field notes are the transcribed notes or the written account derived from data collected during observations and interviews. There are certain formats to create field notes during data collection. Generally, in data collection through observation, field notes are the collection of the material that a researcher or observer observes in a defined setting. Since the huge amount of information cannot be stored in human brain through senses only rather there is need to note this information in proper form so that no detail is neglected. On the styles of the field notes and sketcher, there are two types. One is the descriptive form in which the researcher or observer tries to give a word picture of the setting and situation defined for the study. The other is reflective one. In the reflective form, the observer notes down the perceptions, ideas, concepts related to the area of observation. Among the important characteristics of the field notes are, the information recorded should be accurate, detailed but not intermingled, well-described, and without any ambiguity.

The researcher prepared field notes during his observational engagements in Lahore Fort. Detailed field notes comprised of extended details regarding both qualitative and the quantitative aspects of the structure under observation were prepared by the researcher during observation period. The field notes had numerical observation, including sizes, lengths, widths, numbers and other dimensional calculations that researcher observed. At the same time, quality-wise observation noted in the form of field notes had observed information regarding the quality of the architectural work of the Lahore Fort.

Chapter-I

History & Background

History of Lahore

Lahore is the second-largest city of Pakistan and the capital of Punjab Province. It is historically important region as its history is quite ancient and can be traced back thousands of years (Ahmed 2020). Lahore has been recognized as a crucible of varied cultures as it was a business hub due to its location on the route³ to the city of Delhi. It is to be noted that patrons and conquerors both have a great contribution towards the acculturation of Lahore. Moreover, varieties of cultures are incorporated in this city. The cuisine, crafts, colorful kites, melodious music, enchanting paintings, and fashion design of Lahore promote the incorporation of wide-ranging flavors, patterns, and shades of bold and vibrant colors along with their divergent genesis, contained by the contracted close streets of the ancient city. Varieties in the food, vendors, architects, and artists are not only just because of their emplacement and being, but in terms of cultural relations. Lahore has a distinct standing in the region of South Asia and its popular among not only its inhabitants but also those who ever visited Lahore (Luther 1990).

Etymology

The name of Lahore is linked with the Hindu ancestors, customs, and traditions of their earliest civilization. Lahore is mentioned as a Hindu principality in the old writings of Rājputāna and Kashmīr. The Rājput prince Kānekson was known to be the earliest founder of the city. Lahore is mentioned in sacred Hindu poetry. One of the gateways of Lahore Bhāttī Gate is also named after the Bhāttī tribe from the earliest settlements. So, from these sacred Hindu Purānas it was found that Lahore was considered to be founded by the Rajput's from western India. (Nasarullah 2020)

The origin of the name of Lahore is also associated with interesting Hindu folklore. According to Hindu literature, Lahore and Kasūr were established by the two sons of Rāma named Lāva and Kush. So the Lahore (Loh-awar) and Kasur (Kus-awar) are considered as two sisters and the oldest cities. Lahore is also called Lāvpor, pointing its origin from the Lāva (the son of Rāma). In Ancient writings of Rājputana

³ Grand Trunk Road

the name given to Lahore is Loh Kot meaning “the fort of Loh,” which also has a reference to the son of Rāma, the mystical founder of Lahore. At the same time with reference to the Muhomedan period, the Name of Lahore as “A’lahwār” is also mentioned by the earliest Arab geographers in the ancient Arabic chronicles writings. (Sonn 2011)

These two names from the Hindu legends and by the Arabs geographers coincide as the Al-Idrisī of Morocco, who was a great traveler, mentioned it in his works in the 9th century A.D and called it Lohāwār. The Awār word is taken from the Sanskrit word Awārna which has the meaning of fort. Different names of Lahore like Lohāwār, Lauhaour, Lohāovar, Lohāru, Lāhor had been pronounced and written in ancient scripts by many writers. In the 13th century A.D, Amīr khusrau of Delhi also mentioned of Lahore as Lāhanur in his poetry. It was suggested that the term Lāhanur was taken from the Luhānagar, as nūr is the Dakhāni word for the Nagar which means the town, and the term *nūr* was taken from the names of other towns such as Kānnore, Kalānore, etc. In 710 A.H. or 1310 A.D, the Rāshid al -Dīn wrote it Lāhur, about the meaning of which he says “There is no stronger fort” (Sonn 2011).

Cultural Heritage of Lahore

Jainism

According to many researchers, the most ancient and earliest religion in the region of Punjab was Jainism. Therefore, Lahore became the social and educational center of Jainism. The original culture of the city was inspired by Jain culture. In a book “Life of Alexander” written by a well-known Greek author and philosopher, Lucius Mestrius Plutarchus or modestly known as Plutarch, the conversations and meetings between Alexander and the saints of Jain faith have been mentioned. These saints are called gymnosophists. Therefore, through the study of his book, it was suggested that the original religion in Lahore was Jainism. One of a major and earliest trader community of Punjab region, known as Bhābhra is the follower of this faith and are associated with Bhāvadār Gāchcha, an old Jain temple. While famous Jain Achāry, Kālakacharya is also affiliated with it. It is to be mentioned that through many writings, it was suggested that Bhāvadār Gāchcha lasted till the end of the 17th

century A.D. Still, there are some temples of this faith called Thāri Bhābriān⁴ and Gali Bhābriān (Bronkhorst 2016).

Hinduism

The origin of ancient Lahore was Gurjāra. Gurjāra-Pratihara dynasty was the regal authority that ruled the Subcontinent from 8th to 11th century A.D before the Muslim invaders laid siege of the city in 1001 A.D. In 630 A.D, a Chinese tourist Hieun Tsāng visited the city, mentioned a large town with numerous inhabitant families, who were mainly Brāhmans, and it was located on the east side of the Cheka domain, which stretched from Beas river to the Indus river. Roundabout in 580 B.C, under the rule of king Bimbisāra 543–491 B.C, the South Asian society was distributed into various communities which were distinct on the basis of their livelihood (Bronkhorst 2016).

Similarly, Kshatriyās and the lineage of King Luv was included in this class. Therefore, they were named after the ruler as *Luvānam*, which is known as Luvāna as well. Member of this class from Lohārghat were began to call as Lohārana, which means sword masters, as the word Lohā means iron and Rāna means master. Later this name became Lohāna. In between 337 A.D to 472 A.D, another tourist Faxiān, a native of China, visited the South Asian region and mentioned Lohāna, a town of courageous community which was governing South Asia. In the 11th century A.D, Kurmāng, a Chinese visitor, visited the city and mentioned Lohāna as a powerful empire. A historian, Burton, wrote it to be a community of fearless individuals, who were expanded on a large territory (Bronkhorst 2016).

Lahore; An Ancient Hindu City

It is believed by many historians that Lahore was first inhabited by Hindus, who established colonies which became the parent of other colonies. In this way city rose to be an important place which later became the capital of this significant region. These events can be dated back to between the 1st to 7th centuries A.D, and according to some historians, the Hindu civilization in the city started possibly at the beginning of the 2nd century A.D however, no exact dates could be found. Some evidences were found in the ruins which suggested that ancient Hindu city did not exactly occupy the same site of the modern city. It is suggested that the locality of ancient Lahore was in

⁴ Both temples are located in Lahore city

the neighborhood of Ichrā⁵. At that time, it was situated approximately five kilometers to the western side. At present, Ichrā is a part of the modern city (Khalid 2016).

Formerly, within the village, many ancient, as well as sacred Hindu memorials and shrines, were found, which were named as Bhāiro kā Asthan and Chābndra. Lohāri Gate, which is now main gate of modern city, was named because it was directed towards Lohāwar or the ancient city. In the same way, Kaṣhmīri gate was named because of its direction towards Kaṣhmīri, while the Delhi gate was directed towards the ancient Delhi city and was named after it (Khalid 2016).

It is important to mention that no remains of architectural importance of ancient Hindu city were found. It can be explained by the fact that stone material was not used as basic building material by ancient Hindu civilization. Moreover, city was invaded by different invaders at different periods. These destructive invasions demolished the architectural buildings of the city. It is also suggested that Hindus of ancient city were not, until a relatively later period, in the habit of constructing temples or any other structures of architectural significance. Even in Delhi city, which was epicenter of ancient Hindu civilization and various Hindu empires ruled the city for thousands of years, no samples or remains of Hindu architecture were found which could be date back to the ancient era. Most of the structures present were constructions of the later period of 10th to 11th centuries A.D (S. Chandra 2005).

Lahore in Different Periods

First Period (682 A.D to 1021 A.D)

To trace back the origin of Lahore or its former history, no perfect proceedings and documentation were found. Therefore, the earliest history of this city has given rise to various discussions and hypotheses regarding its age and growth with the passage of time. According to Hindu literature, one of the greatest ruler and father of the Suryāvansha dynasty in Hindu history, Kāneksen, was the pioneer to set foot on fertile land of Lahore. From another source of Greek analysts, in their chronicles of Alexander, had no declaration or indication of a city on the site where present Lahore was observed. Therefore, it was assumed that in 326 B.C city was not established as then it was the time when Alexander raided Asia.

⁵ Ichhra is a commercial and residential area in Lahore, Punjab, Pakistan.

Moreover, a city termed Lābokla was indicated in the *Geographia* by Ptolemy. Its location was described to be near the Chenāb and Rāvī Rivers. This was considered as a reference for the historical analysis of the city. Lābolak was considered, the same city a forsaken precursor for Lahore. In Chinese accounts, *Xuānzang* mentioned a nameless city that was flourishing and vibrant. His details of city give the hint of the nameless city to be Lahore, but it was not confirmed. This Chinese traveler visited the area in 630 B.C. The very first record, which directly indicated Lahore as a city, was in the form of documentation known as *Ḥudūd-al-ʿĀlam*. It meant “the regions of the world.” This book was written in 982 B.C, and Lahore was described as “a town which had impressive temples, large markets, and huge orchards” (Khalid 2020).

Fewer more mentions of Lahore could be traced before the invasion of Subcontinent by Sultān Maḥmūd of Ghazni. Lahore was captured by him in 11th century A.D and he transformed it as the capital of Punjab province which remained capital during the reign of Ānandāpāla of the Kābul Shāhī Empire as well. As a capital, it flourished and became the reservoir of new culture brought by Ghaznavids. Developments were made along with new architectural establishments as well. To serve the purpose of the capital, Lahore city was officially acknowledged, and it thrived under such attentions. From architecture to trade, every aspect of the town was transformed and proved significant in the upcoming era (Taxila Institute of Asian Civilisations 2001).

Second Period (1021 A.D to 1320 A.D)

When Sultān Maḥmūd Ghaznī invaded Lahore city, he designated it to be the second capital of Ghaznavid kingdom. This designation was effective for previously unimportant towns. In 1021 A.D Malik Ayyāz was appointed as the governor of the city by Sultan. Afterward, in 1034 A.D, a revolt initiated by the Governor of Multan, Nīāltigīn, resulted in the invasion of Lahore by the hands of disloyal army of Multan Governor. In 1036 A.D, Malik Ayyāz was successful in excluding the rebellious army from the city.

After the Ghaznavid raid, city of Lahore was left distraught and abandoned but with the assistance and help of Sultān Ibrahīm Ghaznavi, Malik Ayyāz reconstructed the city, and its population density was increased. The city began to thrive again. For protection from outside attacks and invasion, fortified walls were built from all sides,

enclosing the city. A fort of brick was also constructed over the same site of the former fort. The previous fort was destroyed by the Ghaznavid attack and was converted into ruins, left abandoned. The new fort was built in three years, from 1037 to 1040 A.D. In 1043 A.D, an association of Hindu Rāj Kumārs tried to lay blockade to the city of Lahore, which proved ineffective one and ended in 1044 A.D. During Malik Ayyāz 's period of influence, the city became an educational as well as a cultural hub with popularity in the field of poetry. From that era onward, various cultures nurture and flourished in Lahore (Latif, Lahore: Its History, Architectural Remains and Antiquities 1957).

In 1152 A.D, Lahore was officially declared the eastern capital for Ghaznavid Empire during the rule of Khusrāu Shāh. Moreover, after descending of Ghazni in 1163 A.D it was made the exclusive and only capital for the empire. During the second phase of Ghaznavids rule, Lahore expanded and evolved well, as its location was estimated to be on the north side of Bhatti Gate and the west side of Shāh Ālamī Bazār of the current age. Ghaznavids empire fell completely in 1187 A.D and Lahore was captured by Ghūrīds. By that, Lahore became the reservoir for another empire with another culture, art, and norms. Former values and developments retained and absorbed, while a new era of growth started.

Ghūrīds marked the end of the former empire and took Lahore under their rule. Therefore, in 1206 A.D city of Lahore was declared capital for the Mamlūk dynasty of the Delhi Sultanate. This year was followed by another happening which was the murder of Muḥammad of Ghūr. During the rule of Qutb-ud-Dīn-Aibāk, Mamlūk emperor, Lahore became an attraction for educational scholars and poets from different regions such as Turkestan, Greater Khurāsān, and Persia to Mesopotamia, the farthest region. A time came when the number of poets delivering poetry in Persian language became more than the count in Persian or Khurāsān. This exhibits that in a short period of time, education and knowledge spread widely and speedily in the city of Lahore. It became an academic and center of knowledge (Latif, Lahore: Its History, Architectural Remains and Antiquities 1957).

After the demise of Qutb-ud-Dīn-Aibāk city of Lahore became a clash among Ghūrid leaders. Nāsir ud-dīn Qabācha, the governor of Multan, took the city under his command. However, in 1217 A.D, it was invaded for a short period of time by the king of Mamlūk Empire, Iltutmish. Afterward in 1223 A.D Jalāl-al-Dīn Mingburnu of the Khāwārazmian Dynasty, which is known as Uzbekistan in the modern era,

invaded the city when he ran from the raid of Khāwaraz by Changīz Khān. In 1228 A.D, Iltutmish again invaded the city of Lahore. Whereas Jalāl-al-Dīn Mingburnu ran away to invade the city Uch Shārīf and left Lahore.

As the danger of Mongol attacks increased along with the political fluctuations in Lahore, Delhi was viewed to be more safe capital for the empire instead of Lahore. Lahore had always been regarded as the reservoir of Muslim heritage, while Delhi was the forward base in subcontinent. During the rule of Iltutmish's successors, Lahore gradually became the victim of weak capital rule. In that era, governors within the city of Lahore started practicing self-governance as they did not follow the lead of one governor. This disturbed the infrastructure of Lahore as no single rule was applied in the city. Lahore literally became free of influence from Delhi Sultanate during the reign of Kabīr Khān Ayyāz. In 1241 A.D, when Lahore was under the attack of Mongol, it was destroyed and smashed by military forces. When the ruler of Lahore, Mālik Ikhtiyār-al-Dīn Qarāqash ran from the attack, this city came into the hands of Mongols who kept it for some years (Luther 1990).

Lahore was ruled by the chief Tughrul of Mongol military. This city was recaptured by Sulṭan Balbān in 1266 A.D. However, Mongols regained the rule of city in 1287 A.D during the reign of emperor Timūr Khān. The management capital of the region was made Dīpālpūr due to excessive invasions of Mongol. When in 1298 A.D they capture north Punjab once more, Ulugh Khān ceased their invasion, who was the brother of Sulṭan Alāuddīn Khilji of Khilji Empire in 1305 A.D, Lahore was again attacked and captured by Mongols.

Taghlaq Empire (1320 A.D to 1413 A.D)

From 1320 A.D to 1325 A.D, during the rule of Ghāzī Mālik of Taghlaq Empire, the city of Lahore developed and grew steadily. However, in 1329 A.D it was again ruined by Tārmashirin of central Asian Chāhata'ī Khānate. In 1342 A.D, one of Mongol's heads of military, Hulechu Khokhārs, blocked the city. Muhammad bin Tughlaq reinvaded the city of Lahore in 1394 A.D, again, it was snatched by Khokhars. All these invasions and battles destabilized the city. Finally, in 1398 A.D, when Tamerlane took charge of the city after a successful attack, he did not plunder further because the city was not rich any longer (Luther 1990).

Later Empires

After the invasion of Lahore, Timūr handed the command of the city to ruler of Multan Khīḍār Khān. In 1414 A.D, Khīḍār was the one who founded the Sayyid Dynasty. It was the 4th dynasty of Delhi Sultanate. It is also to be mentioned that for a short period of time, another governor of Kabul was appointed by Timūr as the ruler of Lahore, its date ranges from 1432 to 1433 A.D. In 1441 A.D Lahore was again given to Bahlūl Lodhī by the Sāyyid Dynasty as it again became liable to the attacks of Khokhārs tribe. Moreover, in 1451 A.D, the appointed Lodhī ruler dislodged the Sayyid hence, became the Sultān of Delhi himself. Tatār Khān was appointed as the governor of Lahore by Bābur. In 1485 A.D Tatār Khān died in the war against Sikāndar Lodhī. Therefore, command of Lahore city then fell into the hands of Sikāndar Lodhī, who further descended it to Umār Khān Sarwānī. Sarwānī then handed over the rule of Lahore city to his male offspring Said Khān Sarwānī, after a short time of influence. In 1500 A.D, he was also detained from the rank by Sikāndar Lodhī. From there, Lahore came under the reign of Daulāt Khān Lodhī, a male offspring of Tatār Khān. He was the one who employed Gurū Nānak, the father and creator of the Sikh religion.

Mughal Period (1526 A.D to 1857 A.D)

The first Mughal emperor of the Mughal Empire was Bābur. He founded the Mughal Dynasty in 1526 A.D. Daulat Khān Lodhī, the administrator of Lahore at that time, invited him to capture the city of Lahore in 1524 A.D. Babur successfully invaded the city and then it was inherited to Humāyūn, the second ruler of Mughal Empire. When Shīr Shāh Sūrī rose to influence, he replaced the Mughal empire from there this city became the shelter and safe haven for Humāyūn and Kāmran Mirzā, one of his cousins. As Sūrī grew in strength and power, finally, in 1540 A.D he completely blocked the city. In 1555 A.D, Humāyūn attacked and successfully recaptured the city. (Turchin, Hall and Adams 2006)

During the Mughal era, Lahore was reestablished and grew rapidly. This period was considered the most content era in the history of Lahore. Lahore has seen many rulers and dynasties. It faced different cultures and arts, but the most prosperous of them all was the rule of the Mughals. The special achievement was the construction of magnificent structures, which are an asset for the field of architecture even today. The contribution of Mughal in this field is most prominent. These structures were

built all around the empire, but the most important ones were constructed in Lahore, Delhi, and Agra. (Turchin, Hall and Adams 2006)

Lahore under Akbar (1556 A.D to 1605 A.D)

During the reign of Mughal emperors, they did not live in the fortified city of Lahore, as it was not the capital city of the entire empire. People used to live in the periphery as the population was widely expanded outside the walls or within the vicinity of the fortified city. This period of Mughals associated Lahore with minor towns for trade and business. These towns were Kasūr, Eminabad, Amritsar, and Batāla. These towns were called *Qasbah*. (Ali and Athar 2006)

In the start of 1584 A.D, Akbar shifted the capital to Lahore and ordered it to fortify the city and rehabilitate destroyed fortress, therefore laid the base for the reconstruction of the Lahore fort specifically. Lahore was established as one of the twelfth province of the Akbar period. In 1585 A.D, Akbar assigned the command of the Lahore city as well as the Province to Bhāgwant Dās, who was the brother of Marium-al Zāmānī, commonly referred as Jodha Bā'i. The walls of the city were constructed by Emperor Akbar and expanded from the east end of *Shāh Ālāmi Bazār* to add in the Rārra Maidān, which was inhabitant by small number of people. During the period of Akbar, a market known as Akbarī Mandī, a grain trade market was established, which is running successfully even till date. In the 1580s A.D *Dharāmpura* neighborhood was establish by the emperor that is also present till now. Many havelīs found in Lahore are from Akbar's period. Many significant architectural structures of Lahore also were constructed by Akbar, and the city was at its cultural peak during his period. (Ali and Athar 2006)

Jahāngīr's Period (1605 A.D to 1627 A.D)

In the earlier 17th century A.D, Lahore bazārs were the noteworthy elements under Jahāngīr's rule. They were vivacious, lively, visited by outsiders and stored with large quantity of finest quality goods. In 1606 A.D, Lahore was under siege by the revolt of *Khusrau Mirzā* against his father, Jahāngīr. Sikh Gurū Arjan Dev gave his blessings to Mirzā. However, in a battle at Bhairawal, Jahāngīr won. In 1606 A.D, Sikh Gurū Arjan Dev was executed in Lahore due to his interference and association in the revolt. From there, the hostility of Mughals and Sikhs began to rise. In 1637 A.D a tomb was constructed in *Shāhdarā Bāgh* of Lahore for Jahāngīr, where he was

buried along with his beloved wife Nūr Jahān, (see Figure 2) her burial place was also constructed nearby (Flores 2015).



Figure 2: Tomb of Nūrjahān, Lahore.

Shāhjahān's Period (1628 A.D to 1658 A.D)

The fifth emperor of the Mughal Empire was Shāhjahān. In 1592 A.D, he was born in the ancient city of Lahore. Under his rule, he rehabilitated many sections of Lahore Fort and added further structures. His feature building material for the construction was white marble. In 1633 A.D, he constructed white marble structure known as Naulakha Pavilion (see Figure 3).



Figure 3: Naūlakha Pavilion, Lahore.

Shāhjahān expended and bestowed upon Lahore profusely with his lavish and most eminent buildings such as Shāhi Hammām, Shalīmār Gardens along with most lavishly and excessively ornamented Mosque Wazīr Khān Mosque. During his reign population graph of the city showed a rapid increase due to prosperity and peace brought in Lahore during that period. It was estimated that outer districts became about six times more populated as compared to Walled city (Faruqi, Princes of the Mughal Empire, 1504–1719. 2012).

Aurangzīb's Period (1658 A.D to 1707 A.D)

Aurangzīb was the son of Emperor Shāhjahān, and the sixth-great emperor of the Mughal Empire. He was also involved in the development of the city. In 1662 A.D, he built the Ālāmgīri bund embankment down the length of Ravi River. In this way, he protected the city from its continuous change of course, which was a threat to the walls of the city. Several gardens for pleasure were built near Lahore's gentry to make the area an advanced and lavish site near the embankment. The area grew naturally into a beautiful site. During the rule of Aurangzīb, one of the largest Mughal monuments in the city of Lahore was built which was Bādshāhī Mosque. It was constructed in 1674 A.D, and in same year Ālāmgīri Gate of Lahore Fort was also built by Aurangzīb (Hussein 2002).

Later Mughal Period (1707 A.D to 1856 A.D)

In 1707 A.D, after the demise of Aurangzīb, a series of civil wars started for the succession of throne, which consequently deteriorated the command of Mughals over the city of Lahore. Therefore, a long period of decline in Lahore was the ultimate result. In Deccan region, Mughals were distracted by Marathas and Lahore was governed by different governors who vow their association, only by name, with Mughal rulers in Delhi. In 1711 A.D, Mughal ruler Bahādur Shāh died when he was on the road to Lahore as a part of the movement against Sikh revolt. War for the succession of the Mughal throne was fought among his sons, where Jahandar won the battle and throne ultimately (Gilbert 2017).

Under the rule of Fārrukhsīyyar, the Sikh revolt was crushed when Abdus Samad, along with Zakāriyya Khān, compressed them. In early 1739 A.D, for a brief period, Persian forces invaded the Mughal Empire and took away the command of Zakāriyya Khān Bahādur. After Persian forces left the battlefield, Zakāriyya Khān won the command of the city again. Following the invasion of Nādir Shāh, trade

routes were shifted away to Qandāhar as a replacement of Lahore. During this period, Indus port close to the Arabian Sea were also deposited by silt which reduced the significance of Lahore further. Afterward, in 1745 A.D, after the demise of Zakāriyya Khān, struggles among his sons for the succession of throne began, which weakened the control of Mughals on Lahore some more. This left the city liable to the attacks by outsiders due to a lack of firm leadership (Gilbert 2017).

Durrāni Period (1747 A.D to 1823 A.D)

Durrāni Empire was founded by Aḥmad Shāh Durrāni. It was an Afghan empire, and in 1748 A.D, Shāh invaded the city of Lahore. Due to the rapid come back of Aḥmad Shāh Durrāni, Mughals became alert and consequently handed over the command of Lahore to Moin-ul-Mulk also referred as Mīr Mānnu. In 1751 A.D, Shāh captured the city once again and compelled Mīr Mānnu to sign a treaty forcefully that would surrender Lahore to Afghan Rule, and from that day forward, it would be ruled by Afghan Empire. In 1756 A.D, the Mughal Wazīr Ghāzī Imād-al-Mulk seized the city and initiated Shāh to capture the city once more. In 1757 A.D, Aḥmad Shāh Durrāni finally put the command of the city under his son Timur Shāh Durāni (L. Lee 1996).

In 1758 A.D rule of the Durrāni empire over the city of Lahore was intermittent by the attack of the Maratha Empire. Rāghu Nāth Rāo was the one who expelled the Afghans out of the city, and in this way, Lahore came under the invasion of rule. In 1759 A.D, when Afghans tried to gain control of the city, they were defeated in the Battle of Lahore by the associated Sikhs forces. In the third Battle of Pānīpat, Marathas were finely compressed by Aḥmad Shāh Durrāni, who invaded the city again. As a result, Sikh troops reoccupied the city just as Shāh withdrew. Following the events, Shāh tried to invade the city twice after it, but Sikh would capture the city just as he would withdraw (L. Lee 1996).

Geographical Description

Since Lahore had a great advantage of the Rāvī river flowing in its proximity. The old Lahore or walled city was slightly elevated to protect the city from any sort of enemy invasions and destruction due to the river. The old Lahore was originally built in the form of a parallelogram with 461 acres of area within the walls. When the great Mughal emperor Akbar moved to Lahore with his court and the whole army, the city became expanded with increased dimensions and fortifications.

The city was surrounded by thirteen gates, some of which also exist today. In short, the city within these gates was Lahore at that time, which now expanded outside the gates and that is known as walled city. The city of Lahore was the important capital of the Mughal era and consist of a number of elegant landmarks, including monuments, mosques, gardens, tombs reflecting the elegance, power, and taste of the Mughals. Geographically, the city is located at such place along the frontier between the major crossroads which plays a great influence on its urban and architectural forms. In shaping the form of Lahore city, it involved number of features including not only its topography, nature, and climate but also its religious and cultural beliefs, its social and political principles, its street network and the citadel.

Architecture in Lahore

Mughal Period Architecture

In the time of Mughal empire, large number of palaces, havelīs, and gardens were built outside the walled city of Lahore. These havelīs and mansions were residences for the administrators and nobles. In thirteen years of Akbar rule and five years of Jahāngīr reign, many artists, poets, and traders were also drawn to the city. The strategic location of the city of Lahore because of the junctions of roads to Multan, Kashmīr, Kabul, and Delhi and at the same time, its healthy and farmed climate because of the river rāwī flowing along with it made it an important center of Mughal government. The workshops established by Mughals attracted a lot of artists, traders, artisans from nearby countries like Afghanistan, Persia, and central Asia. Their arrival in the city leads to a lot of high-quality productions, and prosperity of the city.

Since there are many palaces, gardens, and monuments of the Mughal period which deteriorated over time, however city's fortification, tombs, mosques, and mausoleums survived until the British era. The governor of Punjab Wazīr Khān 1631 A.D built a mosque named Wazīr Khān Mosque, located inside the Delhi Gate. Another governor Ali Mardān Khān also started the construction of an irrigation canal to water the famous Shalīmār Gardens of Shāhjahān. These gardens were laid out on Bāghbanpūra land. The elegance of the Garden, harmony, and the strong Persian influence manifest the zenith of Mughal gardens. At the time of the construction of these Shalīmār gardens, the Lahore city was famous to be equivalent to the great

Persian city Shīrāz as the grand resort for the people of all nations (Khalid, How old is Lahore? The clues lie in a blend of historical fact and expedient legend 2020).

Lahore enjoyed maximum glory during the Mughal rule. Mughals, who were reputed as the builders and with their incredible sense of architecture, gave the city some of its best architectural monuments, most of which still exist today. During this Mughal period, the Lahore city enjoyed its first-ever era of prosperity, fame, and peace.

Development of Mughal Architecture in Lahore

Mughal monuments are famous for their architectural ornamentation. Architectural ornamentation has its origins in Mughal art like Inlay, stucco tracery, and painting in the Mughal era as they brought new architectural styles and new techniques with beautiful colors. However, the Mughals also practiced frescoes, mosaic, tile decoration, glazed bricks, ceramic decoration, woodwork, burnt-wood work, wood carving, inlaying, and other mixed methods (Koch 1997).

Mughals were famous for their great sense of art and architectural style. Babār the first emperor of Mughal Dynasty who visited Herāt, the residence of his uncle; where he was fascinated by the pavilion with its architectural ornamentation describing the heroism of Timurid Abū saīd Mīrzā. Later on, these decorations became the prominent and the important features of their palaces, forts and other monuments. The king brought Persian artists with him to the Lahore where they worked for him in his court. This tradition of bringing artists and artisans from abroad was continued and these artists were doing fine work influenced by local culture, traditions, materials, and technologies. The Mughals were truly inspired by Persian art, and they had used this art in several of their monuments with their own styles in the form of geometrical shapes (Ali and Athar 2006).

In Mughal monuments, different types of mural decorations were used including, mosaic, tile decoration, paintings, ā'īnakāri, stucco, incised, and inlay. The most famous mural styles were inlay, stucco, tile, and mosaic at that time. The inlay also known as *Pietra-dura*, was the most famous among all of them. Besides *Pietra-dura*, the Mughals also used stucco for decorative purposes in mosques, tombs, and palaces. Ever since the reign of Akbar, ā'īnakāri had been an important technique for decoration and was popular, especially during the Sikh period. The ā'īnakāri used in the Mughal pavilions of Lahore fort, or in Shīsh Maḥal incorporates both Sikh and

Mughal contributions in their decorative program. Shāhjahān used these decorative techniques in most of his buildings in Agra Fort as well (C. Asher, Architecture of Mughal India 1992).

The design vocabulary used by Mughals, especially Shāhjahān in his Shīsh Maḥal and other apartments in Agra fort including, Shāhi Ḥammām, Sardkhāna, Shāh būrj and sleeping chambers in Shīsh Maḥal, etc. mainly consists of floral patterns and designs including flowering plants, stylized arabesque designs, along with individual flowers and vases filled with flowers. These mosaic designs were classified into different categories as geometrical motifs, Arabesque designs, flora and fauna, calligraphy, and many motifs from Hindu mythology. Mughals were the ones who were fond of and inspired by Persian Art and style. And they introduced these gardens under Persian inspiration (Koch 1997).

Lahore Fort

The Lahore Fort is also referred to as the Royal fort, while in the local language of Punjab, it is called Shāhi Qilā. This fort is situated in the ancient city Lahore, in the province of Punjab, Pakistan. The fort is to be found at the north side of the fortified city of Lahore and expands over an area larger than twenty hectares. It comprises twenty-one prominent building structures, several of them are found to meet the date of the Akbari era, the period of ruler Akbar. The Lahore Fort was almost completely restructured in the seventeenth century. This was the time when Mughal reign was touching peaks of splendor as well as magnificence not only in economy and prosperity but in arts, culture, and most important of all in the field of architecture (C. Asher 1992).

Lahore Fort has been colonized earlier with the evidence of the building of clay blocks fortress from early eleventh century. The construction base of the Lahore Fort dates during the reign of ruler Akbar in 1566 A.D. He was the one who adorned the fort with an architectural style that was unique amalgamation and synthesis of two distinct architectural fashions as it featured both Islamic and Hindu elements. Accompaniments and further accumulations from the Shāhjahān period in buildings and monuments are marked by lavish pure white marble with inlaid flower-patterned designs of Persian origin. Despite the fact that the fort was rebuilt, but the addition of majestic and unique Ālamgīr Gate (see Figure 5) was made by Aurangzīb, the last

ruler of the prominent six Mughal rulers, towards well-known Bādshāhī Mosque (see Figure 4) (Dogar 1995).



Figure 4: Bādshāhī Mosque in Lahore.

As the Mughal rule was shadowed due to the incompetence and negligence of the rulers, Lahore fort also fell in the custody of Sikh victors. Therefore, during the Sikh rule, Fort was utilized as the residency Ranjit Singh. After the war of rebellion, Fort was captured from the Sikh occupation to British (C. Asher 1992).

The Fort is listed as a UNESCO World Heritage Site due to unique architecture and character which is referred as an outstanding repertoire among the Mughal structures. Since the very beginning, it enjoyed the status of highly remarked structures due to its creative and inventive architectural as well as the visual zenith. Lahore Fort is situated on the northern side of Lahore's ancient, fortified city. To the north side borderline of the fortress, Iqbal park is located which is known for its historic structure Mīnār-e Pakistan. (C. Asher 1992)



Figure 5: Ālāmgīrī Gate of Lahore Fort. Lahore.

The first chronological orientation to Lahore Fort is from the eleventh century. This century was the time when Mahmūd Ghaznavī ruled. Formerly, the base was prepared with mud bricks that suffered destruction with Mongol invasions in 1241 A.D during their raid on the city of Lahore. Therefore, a new fortress was built by Sulṭān Balbān of the Mamlūk dynasty in 1267 A.D. The reconstruction of the fortress was again damaged by other the invading forces of Timūr in 1398 A.D. Many years later in 1498 A.D after the Timūr invasion, in 1421 A.D, the fortress was then reconstructed only by Mubarak Shāh Sayyid. The fort was captured by Shaik Ali from Kabul in 1430 A.D just after the reconstruction and kept by the charge of Lodhī's till 1526 A.D when the city went through invasion by Babur, the first ruler of the Mughal Dynasty (Dogar 1995).

Architecture of Lahore Fort

The design and structural plan of the fortress can be traced to the year 1575 A.D when the Mughal rule Akbar engaged the site as a station to safeguard the northwest boundary of the territory. Supercilious structures and areas were built with the passage of time, along with thriving green gardens. Noteworthy buildings during the period of Akbar incorporated the Daulat Khāna-i Khas-o'Ām, Jharoka-i-Darshan, and Akbari Gate (see Figure 6). Different buildings of the Akbar era were customized, transformed with modifications, or completely replaced by succeeding rulers (Dogar 1995).



Figure 6: Akbari Gate of Lahore Fort, Lahore.

Jahāngīr was the fourth ruler of the Mughal Dynasty. He proceeded with the amendments in the fort in 1612 A.D and built Makātīb Khāna in the fort. He also built

Kāla Burj (see Figure 7) that comprises angular domed ceiling in Western-style. British demonstrated the presence of Christian iconography in the architecture throughout the Jahāngīr era as illustrations of the Madonna and Jesus. A Mosque named Maryam Zāmānī Begum was built adjoining the Garrisons of east sidewalls during the Jahāngīr reign in honor of his mother. At the same time the mosque possibly provided the services of Friday Mosque or Jāmia Masjid to associates of the imperial court (Ahmed 2020).



Figure 7: The Kala Burj in Lahore Fort, Lahore.

Jahāngīr adorned the gigantic picture wall, which was 1450' in length and 50' in height. This wall was gracefully adorned with a vivacious collection of glassy tiles and other beautiful accessories. The huge, vaulted panels below Jahāngīr's khwābgah, referred to as the Imperial bedchamber, were *azdahs* or dragons with wings from ancient Persian legends. Most of the scenes exhibited over the picture wall demonstrate the life of the Mughal royals along with the sports interests and hobbies to pass the time (see Figure 8). One of the supreme panels is the evidence of four horsemen exhibited playing the noble game of *chaughān* known as polo at the present time. The most outstanding sports were the fights of elephants, one of the favorite recreations of the Mughal era (Dogar 1995).

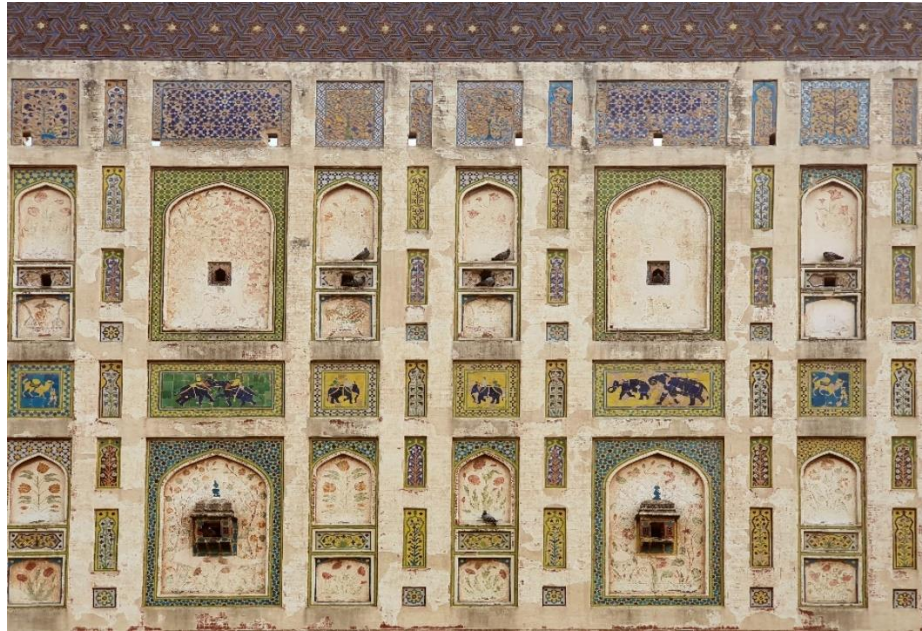


Figure 8: Pictured Wall by Jahāngīr in Lahore Fort, Lahore.

Shāhjahān made many contributions to architecture and added numerous structures in Lahore fort as well. His first donation to the Lahore Fort started in the year 1628 A.D, the year he took the throne and remained persistent throughout his reign. In the first place, ShāhJahān ordered to construct Dīwān i ‘Ām like Chihal Satūn, which was a Persian approach to the public hall with forty pillars. Even though the building of the Shāh Burj, started by Jahāngīr, Shāhjahān proved to be discontented towards the plan and architecture. Therefore, he took the supervision on serious account and asked for renewal of the building. Shāh Burj of Shāhjahān forms a square with the assembly of well-known Shīsh Maḥal and Naulakha Pavilion. Both these structures are accredited to Shāhjahān. The white marble structure Motī Masjid also referred as Pearl Mosque, also belongs to the Shāhjahān era (Dogar 1995).

Aurangzīb, the last ruler of the first six Mughal rulers, also donated in addition to the fort buildings and structures. He built the Ālāmgīri Gate, which is until now used as a chief entrance gate for the fort. Ālāmgīri Gate was designed to have semi-rounded tall towers and pavilions that were domed. By these features, this gate is an extensive familiar symbol of Lahore, and it was on one occasion printed in the currency of Pakistan (Dogar 1995).

Lahore Fort under Sikh Period

The Mughals lost Lahore Fort to the Durrānīs from Afghanistan. Afterward, they lost the fort for a short time to Marāṭhā armies until they were brought down by the Durrānī once again. Later the fort got invaded by the Bhāngi Misl, one of the

twelve Sikh Misls of Punjab. His reign in Lahore lasted from 1767 to 1799 A.D. Army of Ranjīt Singh defeated Bhāngī Misl in 1799 A.D and captured Lahore and consequently the fort as well. In 1838 A.D in the Jind kāur hāveli of the fort, Mahārāja Dulīp Singh was born. 1847 A.D is marked by the Treaty of Bhyrovāl signed by Dulīp Singh, due to which the Sikh empire was brought to efficient closing stages. The control of Ranjit Singh's family lasted until 1849 A.D, before the Sikh rule came to its end (Duggal 2001).

Sikhs, throughout their rule, transformed the sections of the garrison into areas for their personal use. Palaces of the fort for the summer season were utilized by Ranjīt Singh for this personal use. The pavilion of three doors, called the sehdārī pavilion, was addition by Sikhs during their reign. An important temple, the Nāg temple of the fort, was another construction by Sikhs. Ma'i Jindān hāvelī was an existing building that was customized in Sikh reign. In 1841 A.D Shīr Singh, son of Ranjit Singh, demolished public hall Dīwān e ʿĀm as he fought against Chānd Kaur (Kapoor 2002).

Shīsh Maḥal Lahore

The Shīsh Maḥal also referred as the Palace of Mirrors situated inside Shāh Burj block inside the northwest of Lahore Fort. Its construction started in the period of ruler Shāhjahān and completed within one year from 1631 to 1632 A.D. The elaborate pavilion, made up of entirely white marble, which was incorporated by *Pietra-dura* and multifaceted mirror-work with optimum class. The chamber was kept reserved for royal folks along with well-concerned allies. This was one of the buildings among the tomb which was commissioned via consecutive Mughals within Lahore Fort, and it created a jewel in the Fort's crown. Shīsh Maḥal accurately meant Crystal Palace. Though, by *Pietra-dura*, ornamentations and complicated mirror-work incorporated in white marble surfaces and roof surface giving off a luminous outcome. This bountiful room is identified to be the Palace of Mirrors now and then as the Hall of Mirrors (see Figure 9). Similar mirror chambers were established inside the existing Palace of the Agra fort also and another influenced ones in presently flourishes to Amber Fort (Dogar 1995).



Figure 9: Shish Maḥal, Lahore Fort.

At first, the firm brick basis of Lahore Fort was laid in the year of 1566 A.D in the period of influence of Akbar over spot on a former mud-made fortress. Hence, for the construction of a fresh fortress, the ruler hired skilled architects following a conclusion of Fatehpūr Sīkrī. Afterward, Shāhjahān transformed this fortress as an enjoyment alternative and further built, Dīwān-i Khās, Motī Masjid, Naulakha Pavilion, sleeping chamber, and Shish Maḥal into the compound.

This hall was solely used for personal committee gathering, being a component for everyday practice for ruler. This entire building mass was made simply available to the royal princes, the vizier, along with special court members. More development applications for personal residence of Shāhjahān sustained for two years. The most prominent characteristic of Shāhjahāni architecture was projected as widespread use of white marble architecture. Throughout Sikh rule, this Shāh Burj was the favorite lay of Ranjit_Singh. It was he who ordered the construction of the harem on the very apex of Shish Maḥal. He also utilized Shish Maḥal to exhibit his valued ownership of the Koh-i-Nūr. (Dogar 1995).

Shish Maḥal is another construction of Shāhjahān the outlook comprises of cusped marble arches, which are five in number, balanced by joined columns that lead within the square court. Bases with engrailed spandrels were incorporated by means of valuable gems. At nighttime, candles were lit to illuminate the chamber. The ornamental traits also consist of munabatkārī along with engraved marble-Jālī in symmetric and geometric fashion. The ceiling of the mid hall was raised up to two levels. The hall was initially adorned with frescoes, and then mirror-mosaic in diverse colors were introduced (Koch, Mughal Palace Gardens from Babur to Shah Jahan (1526-1648)).

Chapter II

Phases of Architecture

Phase-I: Grey and Red Sandstone (Akbar's Period)

Akbar's age is considered as one of the most acknowledged eras in terms of architecture. It has glimpses of impressive work in the field of architecture and arts. The perfection and fine way of execution symbolize the strength, supremacy, and command. During Akbar's empire, the Indo-Islamic-Persian style developed and grew on the Indo-Pak subcontinent. The outcome of the combination of different elements of architecture formed a new style which further became characteristic feature of the Mughal way of arts. Curvaceous vines, floral art, jewels, and crowns in most vibrant colours like green, red, blue, gold and silver embellish the Mughal buildings.

As the Islamic style of architecture forbids the representation of humans and animals forms in realistic way, therefore, its source is in the conventional theological prohibition against the creation of God. For instance, tomb was considered as a golden opportunity to pay honour to the dead, to highlight their glory and religious obligations by the emperor. As evidence, the tomb of Hāmāyūn and Akbar has proved to be a grand architectural heritage while Mughal reign in the subcontinent started from Bābur (Huzen 1980).

Timūr⁶ is also known as Tamerlane in the west, was the pioneer of the Timūrid dynasty. His descendants led to the formation of the Mughal empire, that lasted from 1526 to 1857 A.D. Timūrid architecture was also an inspirational outcome of Islamic decorations. Buildings were adorned by tiles which were blue, bluish-green, light, and dark blue in colors. Entangled linear and symmetrical patterns were created by these bricks. Timūrid architecture was the preface of Islamic art in 'central Asia' that climaxed and carried on by his successors. Thus, the renowned Mughal School of architecture aroused in India (Ives 1971) .

⁶ Timūr was a Turco-Mangol conqueror who founded the Timurid Empire in and around Modern-day Afghanistan, Iran and Central Asia.



Figure 10: Bibi Khānum Mosque is an example of Timūrīd Architecture.
 Source: "Bibi-Khanym Mosque in Samarkand, Uzbekistan." Picfair.com.
<https://www.picfair.com/pics/09440620-bibi-khanym-mosque-in-samarkand-uzbekistan>.

Mughal reign in the subcontinent started from Zahīr ud-Dīn Bābur⁷. At first, he ruled a small kingdom of Turkestan, but after attacking India and Afghanistan in 1504 A.D, he extended his territory, and in 1526 A.D laid the foundation of a great dynasty. Therefore, Bābur was the founder of the Mughal Empire. From Timur, he was the sixth descendant. His mother, a princess, was a descendant of Changīz Khān. So Bābur was not fully a Mongol due to the ancestry of his mother as his father was a descendant of Timūr. Bābur conquered India with territory that extended from Turkestan to Deccan. In 1530 A.D, he died at the age of forty-seven. (Baumer 2018)

There were six Mughals starting from Bābur to Aurangzīb, who are considered as significant. Their era was the most prosper in the sense of rule, economy, and most importantly, architecture. Buildings for public activity as well as for imperial family members and aides were built. The early Mughal architecture started from Bābur and gained a reputation after victory over Ibrahīm Lodī, which led to the gain of a mosque followed by another one called Bāburi Mosque in Ayodhya. The early Mughal architecture was simple, which comprises of the use of traditional post and beam instead of arches, which were used rarely (Farhatullah 2018).

After Bābur, his legacy was carried on by his son Humāyūn. Humāyūn was the second ruler of the Mughal empire. Born in 1508 and started first reign from 26 December 1530 A.D. He faced challenges from the early years during his reign. He was dethroned by Shīr Shah Sūrī and gained rule after the death of Islam Shah Sūrī, marking his second tenure. Humāyūn reign is also included in the early Mughal architectural period (C. B. Asher 1992). On Jan 27, 1556, A.D Humāyūn died, and his

⁷ Zahīr a-Dīn Bābur, was the first Emperor of Mughal dynasty in Indian subcontinent.

son Akbar successfully ascended the throne of the Mughal dynasty. His reign was the period of the climax. As the trade and economy boosted up due to his policies and laws, including amendments made in arts including painting, drawings, costumes, culture as well as architecture. His phase is known as the era of “Grey and red sandstones” (Craven 1976).

Akbar was born in November 1542 A.D, and at the age of thirteen, on February 14, 1556, A.D ascended the throne (Gowariker 2008). From that date forward, he ruled the subcontinent till his death on Oct 27, 1605, A.D. Bābur as the first Mughal emperor who did not concentrate on the construction of buildings which could be of architectural value because he was immerse in his expeditions to expand the territories of his empire. He was aggressively involved in battles and invaded lands, but he laid the foundation of a dynasty which is known for its magnificent buildings and art (Richards 1995).

Humāyūn was twenty-three when he ascended the throne from his father, Bābur. Then he was dethroned and exiled to Persia; thus, his life was engrossed in fighting and protecting the empire. But during exile, he spent plenty of time in Persian society and was impressed by its culture. He adored and became accustomed of Persian culture, which he further instilled in his son Akbar. That is why Akbar started new culture in the subcontinent depicting the elements of Persian culture in philosophy, drawings, paintings, and architecture. Moreover, the construction of evolved infrastructure that included roads and numerous inns was under Akbar. The grand trunk road in Punjab was also a grand initiative taken by him. Persian artists were privileged to direct the potential local painters to enhance their abilities and to introduce the shade of Persian art in their work. An academy was thus established. Famous painters of Akbar were Lal, Daswanth and Basawan (Farhatullah 2018).

Hence, Akbar is considered as the pioneer of Mughal architecture as the history of their glorious architecture commences with him. He built forts, palaces, public buildings, magnificent gates, mausoleums, mosques, and tombs. By utilizing the talent of local Hindu architects and craftsmen who were well skilled, as Hindu culture was rich in arts. architecture and was quite ancient and flourished, which could be seen in temples and palaces, along with the utilization of Persian ideas and traditional cultural colors, he built his empire. He used red sandstones and grey marbles as the basic building materials. Red colored buildings due to the use of red sandstones. His style is then called the “Akbari style of architecture” (C. Asher n.d.).



Figure 11; Presence of elephant-shaped brackets as evidence of Hindu architecture in Akbar's period.

Akbari's style of architecture illustrates the influences of two cultures in architecture, blended together to form an amalgam of different styles (see Figure 11). The synthesis of Hindu style of architecture and Persian as Muslim architecture gave fusion of two unique and contrast artworks. The analysis of building materials showed that the materials used are different from those used in the early Mughal architecture. This analysis was made by the thorough observations and examinations from the ornamentations of the exterior and interior of the walls from different buildings constructed during the Akbar era. The material of buildings of that time were red and yellow sandstones supplemented by the addition of white marbles with sharp and prominent patterns engraved on the surfaces.

Cultural fusion was created by innovating the architectural components for visual effect rather than symbolic representations. As Muslim style weighs upon the symbolic representations in arts rather than the visual representation as in other non-Muslim cultures. This fusion of the different architectural elements were well executed in work during Akbar's reign (Goetz 2008). From all over the subcontinent, craftsmen were employed along with the liberty to completely depict their art without any restrictions. In this way, a large number of artworks in architecture was created by those men that comprised of Hindu art. The distinguished piece of work among many is Agra Fort, which was featured by its gigantic structure, made up of red stones (see Figure 12). The use of red stones in this fort is on such a massive scale which set off the unmistakable evidence of a blend of Hindu and Muslim style of buildings (Faruqui 2005).



Figure 12: General View of Agra Fort India.

Source: Encyclopædia Britannica, inc. (n.d.). '*Arab sarā'ī*'. Encyclopædia Britannica.
<https://www.britannica.com/place/Arab-Sarai>

Under the reign of Akbar, all the structural designs built were distinctive and unique from any architectural style of the world of that time. Structures built were massive and gigantic in their form. The land surrounding was also vast to further add to the exceptional design of the work. Red sandstone was the basic feature of Akbar's architecture interlinked with marble by the intrusion of marble in the design. Patterns of the ornamentations vary accordingly. In the later period of the 1500s, A.D. mausoleum was constructed. It gained the position as imperial heritage.

By analyzing construction and infrastructure of Gujarat, provides evidence of presence of a style which was a fusion of Muslim as well as Hindu elements of architecture. Red-colored buildings due to the use of red sandstones adorned the city. In south entrance into the city was by the gates. The doorway was prominent due to its structural character and size that is unique in Indian architecture. It is the depiction of excellent architectural techniques used and craftsmanship that is matchless and was splendid in its type.

Mosques were considered holy places, and their construction by the emperor was considered as a chance to fulfill religious obligations. It also exhibits the interests and orientation of the ruler in a religious perspective. Thus, the mosque was constructive of religious importance and was built with more devotion and fondness. The mosque during Akbar's reign was built by considering all such features and proved to be another marvelous creation of Akbari architecture. The most magnificent of all the buildings at Fatehpūr Sīkrī, one of them was a Great Mosque, the Jāmi

Masjid which served as the representation for later congregational mosques built by other Mughals. The mosque's entrance through the south was by a huge gateway called Buland Darwāza (see Figure 13). It gave a sense of immense strength and height, an impact emphasized by the steepness of the flight of steps by which it was approached. Among the most distinctive works of the Akbar's period are:

- Humāyūn's tomb
- Fatehpūr Sīkrī, as new capital
- Jodha Bā'i palace.
- Tomb of Salīm Chīshī
- Akbar's tomb
- Agra Fort

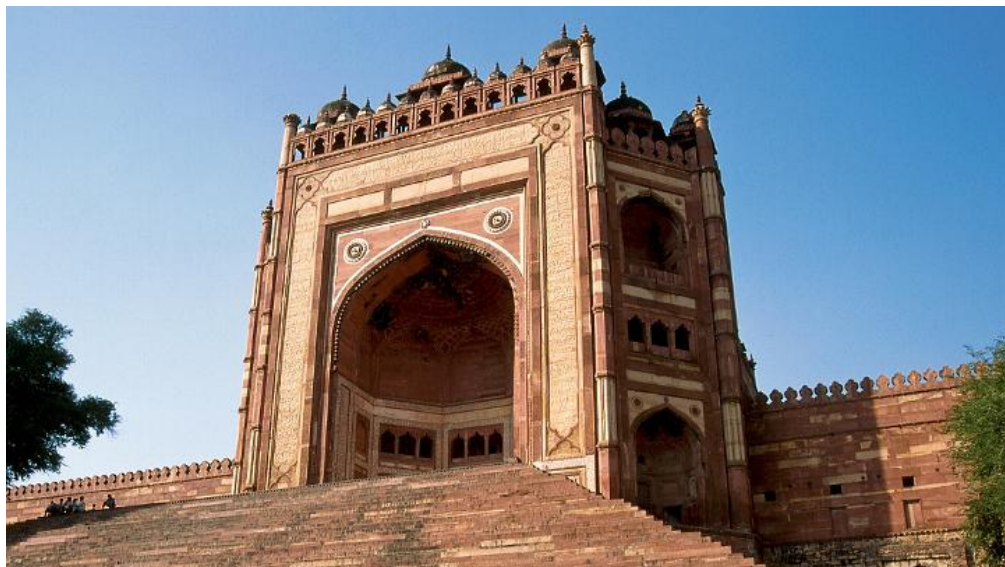


Figure 13: Buland Darwaza of the Jāmī Masjid India.
Source: *Fatehpur Sikri*. The Purple Journal. (2008, July 1).
<https://thepurplejournal.wordpress.com/2008/06/23/fatehpur-sikri/>

Humāyūn's Tomb

At the age of fifty-one, Hāmāyūn died due to a fall. He was buried in the Purānā Qilā, Delhi, where he was residing at that time. His body was then disinterred and was buried in the region of Punjab called Sirhind. In 1558 A.D, Akbar took notice after successfully ascending the throne. To pay tribute to his father, Humāyūn, the second emperor of the Mughal empire, Akbar constructed a tomb to honour the dead. Hence, to pay homage to his beloved father, he ordered the construction of tomb. Under the administration and management of Bega Begum, the widow of the Humāyūn construction began. She lived under the property of the tomb till her death.

A Persian architect named Mīrāk Mīrzā Ghīyāth designed the building. The construction of the building started in 1562 A.D and completed in 1571 A.D. Large numbers of Imperial family members were buried inside the tomb along with the grave of Humāyūn. Later, Mughal kings were also buried here. It was comprised of well-decorated walls, roof, and floor surfaces. As a signature construction of Akbar's era, construction material was typically red sandstone and white marble. Thus, the ornamentations using red sandstones and white marble marked as the architectural building of Akbar.

Gateway of the tomb was described in the following words “the principal entrance to the enclosure of Humāyūn's Tomb is on the western side, (see Figure14) and the doorway is recessed, instead of being endowed as was small usual in all subsequent doorways, but this was done in order to repeat like a refrain, a similar recessed effect in the façade of the main building” (Brown, Monuments of Mogual period 1957). It was mainly red sandstone quarried from Rajasthan and white marble from Makrānā.



Figure 14: The Entrance Gate of Western Side of Humāyūn's Tomb.

Source: Traveler, M.-B. S. A. (2016, April 10). *Discovering humayun's tomb*. Routes.Tips. https://routes.tips/humayun_s_tomb

The tomb is surrounded by garden of vast area. On the west side of the tomb is village and Darghāh of most reckoned and honoured Saint I'timāt al Daula. The whole scenery gives a sight full impression to the visitors (A. Ali 2013). This elaborated interior architecture and decorations of the main hall (see Figure 15). He explained the well-furnished design of the building as rich carpets, as well as

shāmianā, a small tent above the cenotaph, which was covered with a pure white sheet and the copies of Quran in front along with Humāyūn’s sword turban and shoes”.



Figure 15: The Interior of Humāyūn’s Tomb.

Source: Traveler, M.-B. S. A. (2016, April 10). *Discovering humayun's tomb*. Routes.Tips. https://routes.tips/humayun_s_tomb

The whole structure of the tomb is mainly of red sandstone, grey and white marble. It is to be kept in mind that the images used in this chapter are of the present-day tomb, which has undergone restoration work under Āgha Khān Trust for Culture’s effort along with the Archaeological Survey of India. The restoration did not change the major structure of architecture, in spite the minute changes made to filial⁸. However, no primary structural changes were made. The interior where the grave is located is unique due to the faultlessness in the amount and the orientations of the numerous elements with the use of red sandstone with white marble for extreme. Upon entering the tomb, the lush green surroundings can be witnessed in the form of the gardens that surround the tomb. The gardens are planted on the four sides of the tomb. These gardens are square-shaped and are formed with smaller gardens (Burton, 2008). Within these gardens leading to the tomb are water fountains. There are, in total, four fountains which can be seen in each of the four gardens.

⁸ Replaced from bronze to an alloy of gold.



Figure 16: Fountains in the Garden surrounding Humāyūn's Tomb.
 Source: Minz, Sonia. "All You Need to Know about 7 Architectural Wonders of India." All You Need To Know About, September 2, 2016. <https://www.makaan.com/iq/living/7-architectural-wonders-of-india>.

It was said that water was lifted from the Yamuna River that flowed along the eastern wall and from the wells in the northern and western side. It was carried over patterned water chutes, filled the channels, and irrigated the gardens. Moreover, terracotta pipes fed the fountains in four central pools (see Figure 16). Cavities were built where the terracotta pipes fed the fountains with water. The tomb then had a plinth, which was almost octagonal. The plinth has chambers or cells about which has been spoken earlier in the chapter. It is not a perfect octagon but has eight sides (Koch 2014).



Figure 17: Aerial View of Humāyūn's Tomb.
 Source: "The Iconic Historical Monuments in Delhi." Ng Traveller, September 18, 2019. <https://ngtraveller.com/historical-monuments-in-delhi/>.

Amidst these cells had gateways on each of the four sides, north, south, east, and west, which lead to the main entrance. They were made up of mulberry, which was the major timber wood used at Akbar's time (Fazl 1927). Above the plinth was the main structure of the tomb, which is square-shaped and was chamfered on the sides (J. Burton 2008). It is stated, "this main structure stands on the elaborate plinth which is a terrace-like space and within the tomb, there were rooms for travelers who visit the tombs to stay in" (Brown, Monuments of Mogual period 1957). The entry of the tomb was from all four sides (see Figure 17).

It can be seen in that the tomb is bordered by arches. From arched entrances to arched windows, when looking at the anterior view of the tomb, one could see the hollowed-out arch in which there were multiple arched windows and an arched gate. The tomb of Humayūn had arch engaged on the plinth as well as for gateways and hollowed-out arch structures in the tomb. They were also used as attractive motifs on the walls of the tomb. These motifs exhibit the synthesis of Persian architecture.



Figure 18: Double Dome of the Humāyūn's Tomb.

Source: Contents, WA. "Mughal Art and Architecture to Be Highlights of New Humayun's Tomb Site Museum." World Architecture Community. World Architecture Community, April 10, 2015. <https://worldarchitecture.org/architecture-news/cpmhh/mughal-art-and-architecture-to-be-highlights-of-new-humayuns-tomb-site-museum.html>.

Arches were also significant in terms of architecture as the shape symbolized harmony or unity. The point at which the lines merge provided a figurative case that all paths lead to a united one⁹. The convergence of the shape also signified that everything was associated with one or the almighty alone. The religious metaphor can be observed while looking at the entrance of the tomb in terms of how the tomb has a larger arch, which constitutes the entrance to the tomb and had smaller arches in them.

⁹ Also, an Islamic belief

The other essential aspect of the tomb was the dome, which was placed on a circular drum. It was a double dome and surrounded by miniature chatrīs¹⁰. The double dome was made of marble primarily. As said, “In Humāyūn’s tomb, the standard was correctly applied, the dome being composed of two separate shells, one outer and one inner, with an empty partition in-between” (Brown 1957). The outer shell supported the white marble exterior casing, while the inner forms the vaulted ceiling of the mortuary chamber below.

The dome of Humāyūn’s tomb is considered as the precursor for Tāj Maḥal. Emperor Akbar had already been established as one of the most successful kings of the Mughal Empire. It was then, however, not surprising that the forms of architecture employed under him were used as an inspiration for other architectural structures. While Humāyūn’s Tomb is appreciated for its monumental architecture, the same majesty and, to a certain extent, even much more of it was associated with Tāj Maḥal, after all, it has earned itself a position among the wonders of the world.

The style of architecture was said to be a blend of Persian and Indian. The Persian influence was exhibited by elements such as the “arched alcove in the façade” and shape of the dome, while Indian influence could be noticed in the kiosks and cupolas. The main dome was an architectural spectacle. It was built by white marble, and the weight of the dome was balanced out by the drum, which was long and at the center of the structure. This helped to ease the weight of the main structure.

The tomb thus can be studied as a confluence of multiple motifs and architectural styles employed together for beautification. The domes and arches have been employed in harmony to create an aesthetic sense associated with tombs; it could be seen how the arches in the entrance of the Humāyūn’s Tomb were portrayed on the semi-dome arch. It was a culmination of motifs and structures the nature of which, either secular or not, keeps changing with time.

Fatehpūr Sīkrī, as a New Capital

During his reign, Akbar set Fatehpūr Sīkrī as the new capital of his empire. In this regard, the transformation of the city in terms of architecture could not be ignored. Among the four sides of the city, three of them were walls with nine gates as the point of entrance and exit for the city. The remaining fourth side was converted into an artificial lake. The main entrance was through the Agra Gate. Through the

¹⁰ Small umbrella like shape structure

study of the architecture of this city, multi-cultural architecture can be observed. Fatehpūr Sīkrī is the most authentic built which displays the record of the ornamentations of three different cultures, including Hindu, Muslim as well as Chinese.

Religious motives were used in the architecture. Chinese and Hindu religious motives were in abundance and can be configured easily. For instance, the solar symbol in Hindu religion is called as “swāstīka” is exhibited in the monuments with symmetrical design in Fatehpūr Sīkrī. Moreover, at the sultan’s house natural vegetation composition of the dado is enclosed in the swāstīka wonderfully. Sultan’s house is also in Fatehpūr Sīkrī. The greatest achievement of Akbar was to set a new capital at Fatehpūr Sīkrī.

Tomb of Shaikh Sālīm Chīshī

Another glorifying architectural symbol is the tomb of Shaikh Sālīm Chīshī, a well-renowned saint of his time. He was the son of Khwājā Muin al Dīn Chīshī. The reason behind this glory was that he was the one who predicted the birth of Akbar’s heir. As Akbar had no son, he got the blessings of Shaikh Sālīm and became the father of a prince. Akbar named him Sālīm. To pay tribute and respect to the saint, he commanded the construction of the tomb (Uplekar Krusche 2010). This tomb was constructed on a one-meter-high podium with a five steps flight that resulted in the doorway portico. The primary building of the tomb was surrounded by elegant and fragile marble screens on all sides. Thus, the tomb resided in the main central position, the prime hall. One dome, which was semi-circular in shape, was built as a characteristic feature of the tomb.

The building was of marble which was marvelously carved and gave ivory like presentation. The plinth was decorated by the use of mosaics of marble with yellow and black colours, arranged in symmetrical geometric patterns. The enclosure of ebony *chaparkhat* surrounded the marble cenotaph, which was typically covered by a green cloth. A shelter was designed over it in the form of a wooden canopy. This canopy was incrusting mosaic inlay of mother of pearl above it. The door of the foremost chamber was intricately carved with arabesque patterns and bears inscriptions from the Holy Quran. Brown marble bordered the within bays while the relief panels - with the Quran verses - had a blue backdrop. For the

ornamentations of the main chamber, multi-coloured stones, which were also made up of diamond ruby or emerald, were used.

The walls were coloured elegantly by inlaid stones. The inlay work was by *Pietra-dura*, a new style in which rigid and hard stones like onyx, jasper, lapis, topez, and many alike were implanted gracefully in marble. Stone latticework with intricate Jālī was also an art that was introduced during the construction of the tomb (see Figure 19). Moreover, all around the tomb of Salīm Chīshī Jālī was compiled. It was see-through and added in the elegance of architectural design.

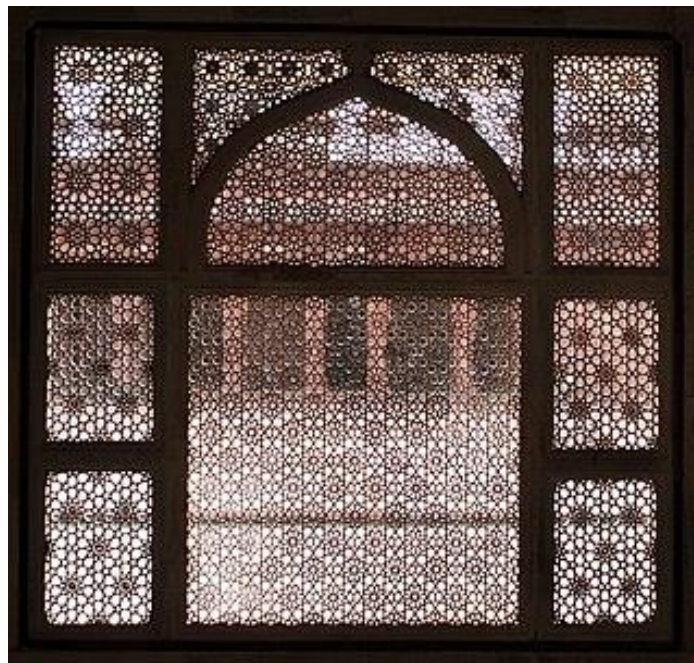


Figure 19: Stone Latticework on the Window at Tomb of Salīm Chīshī.

Source: "Fatehpur Sikri." TrekEarth.

[https://www.trekearth.com/gallery/Asia/India/North/Uttar Pradesh/Fatehpur Sikri/photo115493.htm](https://www.trekearth.com/gallery/Asia/India/North/Uttar%20Pradesh/Fatehpur%20Sikri/photo115493.htm).

During the life of Akbar, he himself considered the construction of his own tomb. He chose the fitting sites and location for the building. Thus, during his reign, construction started and successfully completed during the reign of his son Jahāngīr. The cost was estimated at about 1,500,000 rupees. There were four gateways in the tomb, but now the only southern gate is used to enter. The rest of the three were built only for decoration to enhance the structural beauty of the building and were not used as gateway. This gate was constructed by using red sandstone, and many designs were inlaid using marble. The crown of the entryway had four kiosks. The radiance of the gateway is stimulated by the Buland Darwaza, which was constructed in Fatehpūr Sīkrī. The gateways were built in such a way that they remained above and raised at a

fine height from the garden, and staircases were built there to move toward the gateways.



Figure 20: Four Minarets of Akbar's Tomb.

Source: "Sikandra Fort." indiamart.com.

<https://www.indiamart.com/proddetail/sikandra-fort-3423751091.html>.

Akbar got the idea of char Minarets when he visited Deccan in 1599 A.D. Four Minarets were built on the southern gate of the tomb (see Figure 20). There are three further stories in each *Minar*. The tomb of Akbar at Sikandra itself is a layout of the supreme architectural works of its era. It highlights the prototypes of Mughal architecture. It is another important architectural masterpiece of the Mughal age. Adorned with the green lawns and gates, it signifies the strength and dignity of Akbar's period. The constructions attributed to the golden Mughal era in terms of architecture and art.

Palace of Jodha Bā'i

During the construction of Fatehpūr Sīkrī, the Jodha Bā'i palace was constructed by Akbar (see Figure 21). It is vast, largest, and most essential part of the Royal Harem. It had all the necessary and advanced facilities, security, and conditions. The name Jodha Bā'i Palace was considered improper as a misnomer in itself.

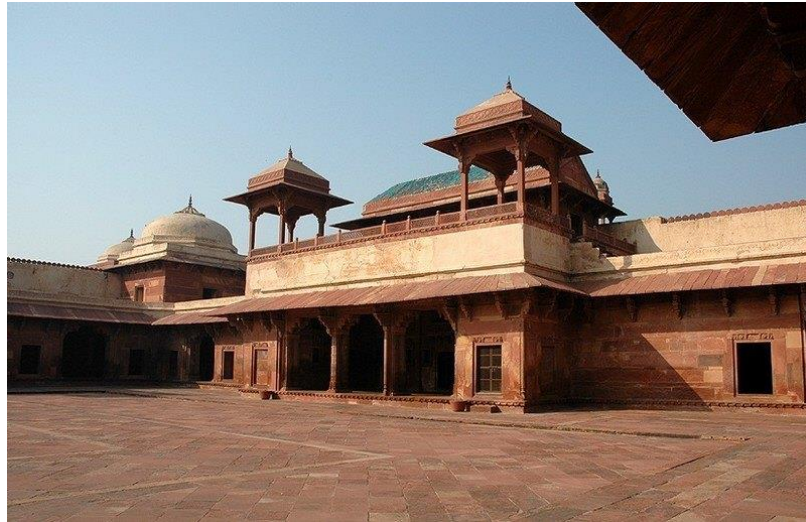


Figure 21: Palace of Jodha Bā'i at Fatehpūr Sikrī.

Source: Trawell.in. "Jodha Bai Palace, Fatehpur Sikri - Timings, History, Best Time to Visit." Trawell.in, November 10, 2020. <https://www.trawell.in/uttar-pradesh/fatehpur-sikri/jodha-bai-palace>.

Dimension of the palace was 231' in length with 215' width, a rectangular-shaped block. At the eastern side was built a single glorious gateway for entrance purpose. It was protected chiefly by guardrooms. Gateway had a triangular ceiling. Various Hindu motifs adorned the ornamentations of the building. Hindu motifs like swan, elephant, parrot, sṛīwasta symbol, lotus, ghant mātā etc (see Figure 22) were used in the decoration of the interior. This proved that the resident of the palace was a Hindu lady.

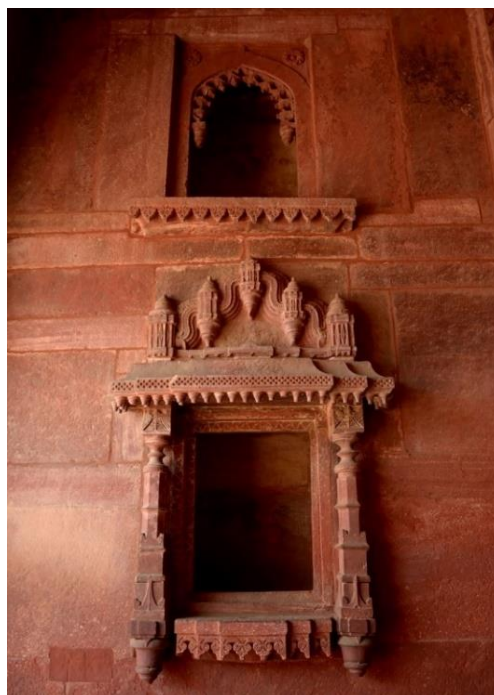


Figure 22: Hindu Architecture depicted in the Interior of Jodha Bā'i Palace Fatehpūr Sikrī.

Source: Don't just "click" pictures; Shoot Stories! "Jodha Bai's Palace, Fatehpur Sikri (23)." Flickr. Yahoo!, April 21, 2015. <https://www.flickr.com/photos/nileshkorgaokar/17195957326/in/photostream/>.

The colonnaded dālān had curved squared-shaped pillars, which contained beautiful moldings and awfully polished brackets. The western suite which served the purpose of the temple had brilliantly rounded and carved pillars with brackets. The suite contained several Hindu motifs. The structure of the building was super as it consisted of Chatrīs with eight prominent pillars, domes of semi-circular shape, and triangular Khaprels roofs. The arabesque designs in glaze bricks adorned the corner domes and khaprel ceilings. The beauty of red sandstones charms the viewers in the location of the Fatehpūr Sīkrī's Jodha Bā'i palace while analyzing the building designs. Stylishness and class embodied the whole complex. It was adorned by the most excellent elements of the reign of Akbar. Among the monuments in Fatehpūr Sīkrī, one of the most admired and prestigious is the Palace of Jodha bā'i.

Agra Fort

Agra Fort is also referred to as Red Fort. It covers the area of 94 acres and present on the front view of the Yamuna River. The walls of the fort were kept quite high. They are wide and are 70' in height (Srivastava 2011). At present, about two dozen monuments and more are located within the fort from which, a number of monuments were constructed by Akbar. They were ruined with the passage of time and rather by the extensive renovations made by the following rulers under their period. As the basic feature of Akbari architecture, monuments built by him have the Bengal and Gujarat architecture blended together to form the structure which could be distinguished by their unique artwork. Now the residual monuments are the Akbari Gate, Bengal Maḥal, Delhi Gate, and various others. Three mosques were built after Akbar, which were Motī Masjid, Mīna Masjid and Nagīna Masjid. For protection and security purposes, two barbicans around the two gates were also built along with various palaces.

Four gates were built to enter the fort named as follows:

- Khidr Gate
- Amar Singh Gate
- Delhi Gate
- Ghaznī Gate.

Khidār Gate is also known as “watergate” as it is located on the side of the river. Amar Singh Gate, which was called Akbar Darwaza in the past, was renamed

by Shāhjahān as to be Amar Singh Gate (see Figure 23). The name depicts the historical event which inspired the emperor.



Figure 23: Amar Singh Darwaza of Red Fort, Agra.

Source: "Agra Fort - Erbe Der Menschheit." IMDb. IMDb.com.

https://www.imdb.com/title/tt0204125/mediaviewer/rm2152227840/?ref=tt_ov_i.

Delhi gate was built by Akbar from 1568 to 1569 A.D. In contrast with the other three gates, it is the most stylish, classic, and refined gate. It is present on the western side of the fort. Its work and architecture which makes it unique as compared with the other gates. As a draw bridge was made and used to turn at the right angle of 90 degrees sandwiched between the inner and outer gates. Bridge was drawn to enter the fort. During Akbar's reign, it was the main entrance. The security of the gate was enhanced by the concept of Draw Bridge and sharp curves to prevent the outer invasion. The inner doorway is called Hāthī pol as it has two elephants made of stone for the purpose of security. Instead of single-layered fortifications, double-layered walls were made along with the insertion of bastion of circular shape at equal intervals along the length of walls. The bastions made around the gate were kept high. These architectural modifications fortified the gate from the invasion.

The gate that belonged to the tomb of Maḥmūd Ghaznavī is called Ghaznī Gate (see Figure 24). Ghaznī is the location of the tomb of Maḥmūd Ghaznavī.



Figure 24: Ghaznī Gate Agra Fort.

Source: SquareKufic, Posted by. "The Tomb of Sultan Mahmud and Its Gates, Commented by Robert Byron." SquareKufic, July 26, 2018. <https://squarekufic.com/2018/07/26/the-tomb-of-sultan-mahmud-and-its-gates-commented-by-robert-byron/>.

According to the historic record and folklore, one of the biggest palaces was the Akbari palace. But now it is ruined. Its construction started from 1565 to 1569 A.D. Akbari Maḥal had many rooms for accommodation with a vast courtyard. Tourists can visit the place and see the remains. Many rooms can be seen with halls out of which one has three openings towards the river. Bengal Burj has a large hall and dome. Akbar Baoli is also present near this Burj to provide the water for adjacent rooms. Red sandstone was used as the prominent building material along with brackets and plane ceilings.

Jahāngīrī palace was the construction of 1565 A.D that was completed in 1569 A.D. A courtyard was enclosed by many structures, including corridors and rooms. It was used by the imperial members, such as the wives of Akbar, who were Rājput. Afterwards it was accommodated by the wife of Jahāngīr, Nūr Jahān. Bengali Maḥal was constructed by Akbar as another palace in the Agra fort. It has underground apartments which were two-storied. Afterward, this place was chosen by Shāhjahān for the construction of a structure called Mūthamman Burj for his favorite wife, Mumtāz Maḥal.

Chapter III

Phase-II; Sandstone and White Marble (Jahāngīr Period)

After Akbar, Jahāngīr ascended the throne of the Mughal Empire and became the fourth emperor of the great empire of Mughals. He was the only surviving son of Akbar and was born after many prayers and blessings. He was born on 31 August 1569 A.D in Fatehpūr Sīkrī, the capital of the Mughal Empire at that time. He was the son of Rājput wife of Akbar, Marium-al-Zāmānī, also known as Jodha Bā'i. As Akbar the great, was worried because his many other children died at young ages of infancy. To pass his legacy, Akbar needed an heir and to pass the throne of the Mughal Empire. Therefore, Akbar consulted and approached many religious figures and saints to get their blessings and prayers for the birth of a male child. After the prediction and blessing of saint Shaikh Salīm Chīshī, Akbar's wife, Marium-al-Zāmānī, gave birth to a male child. This blessed child was named "Salīm." The name was the inspiration from the Salīm Chīshī, who blessed the couple. Thus, he was named after the saint.

During the early adult years of his life, Salīm was rebellious on many occasions and even defied his father Akbar on variety of occasions, but later father and son reconciled. Akbar nominated Prince Salīm as his successor on death bed, and he died on 5th October 1605 A.D. Afterwards, on 24th November 1605, A.D Salīm ascended the throne successfully but is considered rather forcefully due to his conflicts with his father. He changed his name from Salīm to Jahāngīr as a ruler. Jahāngīr is a word of Persian origin, meaning world seizer. In history, he is known as Jahāngīr. He ruled from 1605 A.D till his death in 1627 A.D. He is considered the most powerful, strong, and prominent ruler of the Mughal empire. He is famous for his expeditions, battles, and enhancement in the territories of the empire. He expanded land under his rule and ruled the vast area as compared with the territory under Akbar's rule.

After the intensification and growth in military skills, Jahāngīr gave importance to arts, especially paintings and architecture. The growth of architecture during his era was also prominent as he followed the footsteps of his father, Akbar. Jahāngīr's era is considered as the phase of sandstones, and white marble as the basic building material used in the architectural structures was sandstones and white marbles. He continued the construction of Akbar's tomb. Akbar commenced the

construction of this tomb during his own reign, and after his death, it was completed by Jahāngīr. Construction of the building was from deep red sandstones used during Akbar's period but was further amplified by Jahāngīr with the use of white marble. The ornamented inlaid panels of white marbles along with sandstones enhance the beauty of the tomb along with the chief gate (see Figure 25). Moreover, the design was symmetrical, geometric, floral, and calligraphic (see Figure 26). The complexity and elegance of the designs were also linked with the incorporated designs in the tomb of Itimād ad Daula, which was constructed during the reign of Jahāngīr.



Figure 25: Inlay Panel of white marble with floral and geometric designs at the south gate of Tomb Akbar.

Source: "Wit Press Elibrary." WIT Press. <https://www.witpress.com/elibrary>.



Figure 26: Calligraphy on the top of the entrance to the burial chamber of Akbar at Tomb of Akbar.

Source: Verma, Tripti. "आइए पता करते हैं, मुगल कला कैसे विकसित हुई?" [https://hindi.nativeplanet.com](https://hindi.nativeplanet.com/travel-guide/akbar-tomb-in-sikandra-hindi-001029.html), August 10, 2016. <https://hindi.nativeplanet.com/travel-guide/akbar-tomb-in-sikandra-hindi-001029.html>.

During his reign, Jahāngīr commissioned many paintings as well as many portraits of himself. The Mughal paintings, along with architecture, nourished and grew under the reign of Jahāngīr. In this way, many artists were provided with several beneficial opportunities. Many previous paintings, custom-made by his father, Akbar, were also conserved by Jahāngīr, which showed his interest in the arts. Jahāngīr was extremely inspired by the Western style of art and building designs. Thomas Roe, an Englishmen representative, mentioned the prominent influence of European art and designs. The emperor would have his court painters reproduce a European miniature and then would challenge Thomas Roe to pick the original work. Whenever Roe failed to pick the original work, Jahāngīr would derive immense satisfaction and pride from it. Jahāngīr, like many other rulers, also encouraged foreign artists from the world of different regions and cultures to flourish and express their talents in this field, in the Mughal court as well as on the subcontinent grounds.

Thus, Jahāngīr inherited the stance and manner of his father, Akbar. Ignoring most of the conquest later during his reign, Jahāngīr abundantly established and flourished architecture, painting, literature, and philosophy. Jahāngīr period as an emperor is considered as the richest period of Mughal culture. His era was the age of Mughal splendor. Indian, Muslim, and western artists, along with scholars, and architects marked his period as a blend of three different cultures in an admirable way (Fatehullah 2018). Jahāngīr's interest deviated from Hindu to Western culture. Rather than an illustration of real-life events in fiction like Akbar did, Jahāngīr preferred paintings and portraits for the illustration. The scientific study of birds, flora, and fauna, along with their portrayal in paintings, was encouraged by him. These were then collected in the albums. Among his talented painter, Mansūr and Manohar were his favorite and famous painters.

Jahāngīr resided in Lahore during his reign. He built new structures and monuments there, but they were not large in number as his precursors. Akbar built a large number of structures in Lahore during his era, but Jahāngīr architecture affected the important change from red sandstone to marble in his architectural structures. It is to be noticed that during Akbar's reign, Hindu influences were at their peak. Hindu culture: art, painting and architecture climax and was acknowledged by Akbar, but this influence declined during Jahāngīr's tenure. This decline could be witnessed by the analysis of structural designs by Jahāngīr (Koch, Mughal Architecture: an Outline of Its History and Development, 1526-1858 2014).

Jahāngīr's style of architecture was Persian, as it could be seen at his great mosque at Lahore. Persian style covered the tomb of Itimād ad Daula with enameled bricks. The tomb of Itimād ad Daula was constructed with marble that was white, as a prominent building material as it covered the structure wholly and was covered with *Pietra-dura* mosaic as ornamentation. *Pietra-dura* covered the whole area of the tomb. He built verinag and Chashmā Shahī, gardens which were wonderfully constructed and built by Jahāngīr during the spring. The view of these gardens was delightful and splendid as flowers blossomed during the spring season and these were built around the spring.

Moreover, the Shalīmār Garden was also included in his creation. The design was sophisticated and unique in its structure as it was distinguished by series of pavilions on pillars which were carved. The pillars were surrounded by pools of water along with constructed seats which could be reached by steps made up of stones. The Shalīmār Garden, along with other pavilions, was built on the shore of Kashmir's Dal Lake.

Jahāngīr's tomb had no other tomb as it was favored by Jahāngīr himself. Only minarets and decorations were the prominent features of his tomb. The excessive employ of marble that was white as a building material, along with the inlay of white marble as ornamentation motif, were the two main and significant features initiated and introduced by Jahāngīr.

Tomb of Itimād ad Daula

Tomb of Itimād ad Daula is another historic structure that was constructed during the reign of Jahāngīr in Agra city. It was also known to be Jewel Box. The tomb was built from 1622 to 1628 A.D (see Figure 27). Architecture of the tomb represented the change in the middle of the first phase of Mughal architecture, Akbar's period to period of Jahāngīr, the second phase which was based upon the use of sandstone and marble that was white as building material along with *Pietra-dura* inlay. The tomb was constructed on the order of Nūr Jahān, consort and wife of Jahāngīr, for Mīrza Ghiyāth Baig along with her mother Asmat Begum after their death. Mīrza Ghiyās Baig was the father of Nūr Jahān, as well as the Prime Minister of Jahāngīr. Itimād ad Daula, was the title bestowed to Mīrza Ghiyās, which meant pillar of the state. The mausoleum was a masterpiece of a class with no dome of

Mughal tombs. It was the first building completed in white marble and transitioned the transitional phase from red stone to white marble.



Figure 27: Front View of Tomb of Itimād ad Daula, Agra.

Source: "Itimad-Ud-Daula's Tomb." Temples Vibhaga. <https://temples.vibhaga.com/attraction/itimad-ud-daulas-tomb/>.

This mausoleum was built at the location that was the east side of the Yamuna river and at the mid of Chāhārbāgh¹¹, along with its enclosure by the surrounding walls and other structures. The main entrance was built to the eastern side with decorated gateways in the northern and southern directions, with lush green gardens. On the western side, an open porch was designed that was multi-storied and exhibited the inspiring view of the river (see Figure 28). The structures were built with white marbles that were inlaid with valiant designs and sandstones. The tomb came into view from the main opening as it was built in the pivot center.



Figure 28: View of the river from the west side of Tomb of Itimād ad Daula.

Source: Tol-Admin. "Tomb of Itimād-Ud-Daulah, a Legacy in Stone." Tree Of Life, <https://treeofliferesorts.com/heritage/tomb-of-itimad-ud-daulah-a-legacy-in-stone/>.

¹¹ Four quartered garden.

In the heart of the mausoleum, there was slightly high stone cemented pathways along with water channels that were shallow, and intruding cascades and tanks were also built—this separated garden surrounding the tomb into four equal sections. Gardens were planted with lush green grass, and they could be easily converted into flower beds. The plantation of large trees and plants was set aside to the walls that were surrounding the tomb from all around. The sight of the mausoleum was kept clear and opened without the plantation in the middle. The main building of the tomb was a splendid white marble structure that was planned in the middle of the garden.

Moreover, plinth comprising of red sandstone in the middle from every side was built upon which the main structure, stood. The plinth was facing the central arch that was a lotus tank with cascade. The geometry of the tomb was made square in shape with octagonal towers, Chatrīs placed on the top were attached to its corners. Each front wall had three arches, the central arch allowed entry, and the other two arches on the sides were closed by Jālī (see Figure 29). For protection, each side of the arch was protected by the construction of Chajja. On the top Jālī barrier was inserted that served the purpose of protections as well as enhance the style of the arches.



Figure 29: Jālī in the Arch of Façade, Tomb of Itimād ad Daula.

Source: “Detail Decoration Geometrically Patterned on Wall Stock Photo 1379743382.” Shutterstock.
<https://www.shutterstock.com/image-photo/detail-decoration-geometrically-patterned-on-wall-1379743382>.

This building was a dome less structure while a square-shaped Baradari was built on the roof, comprising of three arched openings that were closed by Jālīs. It was secured by Chajja, on the top of which the Chaukhandī roof was built. This roof was

further crowned with lotus petals. The interior of the tomb was comprised of a mid-square-shaped hall accommodating the cenotaphs of Asmat Begum and Mirza Ghiyāth (see Figure 30). Four rectangle quarters on the sides and four-square shaped quarters on the corners, every single one interrelated by the identical doorways, were built in the central hall. The cenotaph of Asmat Begum was in the precise center of the hall. Corner square quarters had tombstones of other relatives of Nūr Maḥal.



Figure 30: Cenotaph of the Tomb of Itimād ad Daula.

Source: Limited, Alamy. "Baby Taj Mahal in Agra India Stock Photo." Alamy.
<https://www.alamy.com/stock-photo-baby-taj-mahal-in-agra-india-141741043.html>.

Most central characteristic of this tomb was its multi-coloured embellishment. There were attractive flower patterns along with arabesque and geometrical designs. Such designs were exhibited on the whole exterior walls. By the use of inlay and mosaic ways in different pleasant colours and tones, these designs adorned the surfaces. Persian motifs such as cups, dishes, vase, cypress and *guldasta*¹², etc. (see Figure 31) that were the trait of Jahāngīr's art were depicted. Ustād Mansūr Naqqāsh was the famous and favourite painter of Jahāngīr, many floral collections used in the designs were inspired by his artwork. Carving has also been done for stylized designs which gave the illusion of embroidery work. Elegance and grace were represented in the quality of the designs.

¹² Flower bouquet



Figure 31: The Floral Artwork on Marble Walls with Geometric Borders, Tomb of Itimād ad Daula. Source: “The Mausoleum of Itimad-Ud-Daula.” Sahapedia. <https://www.sahapedia.org/the-mausoleum-of-itimad-ud-daula>.

Motī Masjid

Motī Masjid was built in 1617 A.D during Jahāngīr’s reign as a part of Daulat Khāna-i Jahāngīrī. It was constructed in Motī Masjid Quadrangle in Lahore Fort. The Persian inscription on the wall of the arched entrance of Makātīb Khāna proved as witness that the building was indeed constructed by Jahāngīr. This inscription was recorded as *“In the twelfth year of the fortunate reign of His Imperial Majesty the shadow of God, like Solomon in dignity, Kyamurs in pomp, victorious in arms like Alexander, the Defender of the Faith, Shāh Nūr-al Dīn Jahāngīr, son of Jalal-al Dīn Akbar, the King, the Conqueror of the infidels, this noble edifice was completed in 1007 A.H by the efforts of the humblest of disciples and the least of slaves, his devoted servant, Ma’mūr Khān.”* The Mosque was built under two phases. Second phase was during the reign of Shāhjahān. The building is facing decay and decomposition nowadays due to negligence and poor maintenance. (Nadiem, Forts of Pakistan 2014).

The structure was entirely built with white marble. Three domes were constructed with a central dome larger than the other two domes lying on the sides. In the prayer chamber, the arched openings were multi-cusped. Floor of the building was also made with white marble. It was separated into Muṣallā by the marking of lines in black marble (see Figure 32). In the eastern part, seating arrangements were made to serve the purpose of Makātīb. Motī Masjid quadrangle included dālān, Makātīb Khāna and Moti Masjid. It is a dālān which was enclosed and considerable large. All three arched openings of dālān were of red sandstone screens. North doorway is the chief opening used at present, which is small. The surface of doorway was made with

recessed panels of varying dimensions and shapes. These panels were in rectangular and square-shaped separations. The rectangular panels had recessed cusped arches.



Figure 32: Black Stone Lining for Muṣallā on the Floor of Motī Masjid.

Makātīb Khāna is another section of Quadrangle with gigantic and high gates which are on the southern side of Jahāngīr's Quadrangle. This building is truly a model of Persian sheltered court due to simple sharp pointing arches, which on all four sides form an arcade. These arcades were built on a high stage where each of the arcades was further divided into five sets of arches with a central arch bigger than the other side arches. Makātīb Khāna was symmetrical in architectural plan (see Figure 33). This place was used by clerks for the entries to the palace (Nath 1982).

For the ornamentations of building, aesthetical designs used by Mughals were unsurpassed due to their supreme artistic approach. Vibrant colour and use of floral decorations were dominating in Mughals. In the same way, different section of arcade were adorned with expressive floral movements, especially on the central alcove ceilings, which were plastered. The radiance and excellence of these designs and colour showed the perfection in architecture during Jahāngīr's period. Grapevine motif and with curvaceous floral branches and patterns showed aesthetics that are remarkable and enhanced the beauty of simple structures.



Figure 33: Eastern Entrance View of Makātīb Khāna, Lahore Fort.

On the west of Makātīb Khāna, Motī Masjid was constructed. Northside opening of Makātīb Khāna was arched which as decorated with the fresco plastered ceilings lead to Motī Masjid. The building of the mosque was comparatively minor but pure, plain and splendid, and the last of all striking domes, of lined up pure white marble was like the shine of a pearl. A stairway made of red sandstones leads to a raised area that gives access to the entrance foyer of the mosque and further leads to the main courtyard of the mosque. The perimeter of the platform was decorated with a continuous band of red sandstone carving subsequent with a bell-shaped floral pattern. One step up was another band of carving that looked almost same from a distance, but a closer look would have revealed that details have been badly neglected in the band that was placed on the edge of the platform. Carvings of the set of steps platform with fewer fine points may have been placed later as a replica of other during restoration as the quality of the stone was also compromised, and it was carved in pieces rather than a long continuous relief. The difference in colour and grains was also apparent (C. B. Asher, *Architecture of Mughal India* 1992).

Motī Masjid could only be accessed through a small door from the entrance foyer, and it was in the rare corner rather than cantered. The walls of central foyer on right and left were separated by recessed arched niches from the floor plane. Spaces that were developed in these niches made various semi-octagonal areas to some extent above than floor altitude where worshipers could frequently sit. Boundaries of these rest areas were corniced with the same band of bell shape floral carvings in white marble as introduced on the stairway. A considerate delicate flora rock band applied repeatedly for adornment in the mosque created an effect of elegance. It also revealed the skills and knowledge of Mughal architects.

Elegance, the surface of petals and fine quality of lyrical curves in the band was built to be eye-catching. The mosque's antechamber was an enclosed space. Bright sunlight brightened the court of masjid just like a dazzling structure that shined like luminous pearl. From the center of the courtyard of mosque facade of the Motī Masjid could be seen, which was divided into five inlets with the central inlet projecting rather onward towards the courtyard. The five-inlet facade was a favoured Jahāngīr's architectural feature that was also seen at the Maryam al Zāmānī Mosque. Therefore, this distinctive feature was employed in the majority of Mughal mosques. The front cusped arches were balanced out by baluster columns puffiness form of the half-open flower with their even and very well contours.

The façade of the Mosque displayed ten arches in the form of five sets which was a merger of multi-cusped arches and pointed arches (see Figure 34). The central arch was sharp and superior to other arches and lead towards the Qiblā wall. The difference in the mass of arches gave a notable view of the mosque façade. Multi-cusped arches adorned the chamber used for prayer or courtyard of worshippers. The dimensions of the courtyard of worshippers were 50' in length and 33' in width. This structure was uncomplicated, temperate, and spotless that gave a sense of splendour.



Figure 34: Five Inlets Façade of Motī Masjid.

Symmetry in Mughal architectural buildings were amazing; however, the design of this mosque was a bit different. The sketch of this structure was not regular like other mosques neither the main doorway to the mosque was made central. From

the courtyard towards the direction of Qiblā, prayer chambers were on the right side, while walls of the left side of Motī Masjid courtyard illustrated recessed cusped arches. Variation in the design of arches was used in Motī Masjid. By using the arch pattern, important spans could be achieved. This was because all the compressive forces hold it together in a state of constancy which was necessary for the building of a fortress (Koch 1982)

Motī Masjid may have served as a praying area for the royal harem but there was no ablution area or central fountain existed which was an imperative part of all mosques. As the mosque went through many phases of serious negligence and exploitation so, the ablution area may have been there as part of mosque and afterwards removed, but no such evidence was found. Two aisles with five bays were built in the interior of the mosque and, to a little degree, raised doorway with a rectangular frame. The interior of the mosque was plain and temperate with the exemption of the ceiling that was ornamented (see Figure 35). The ceiling of all three domes was followed by dissimilarity in style and design. They were constructed with marble that was lined, and geometrical patterns were made that were symmetrical. The mosque's Mihrāb appeared directly towards the Kaba.

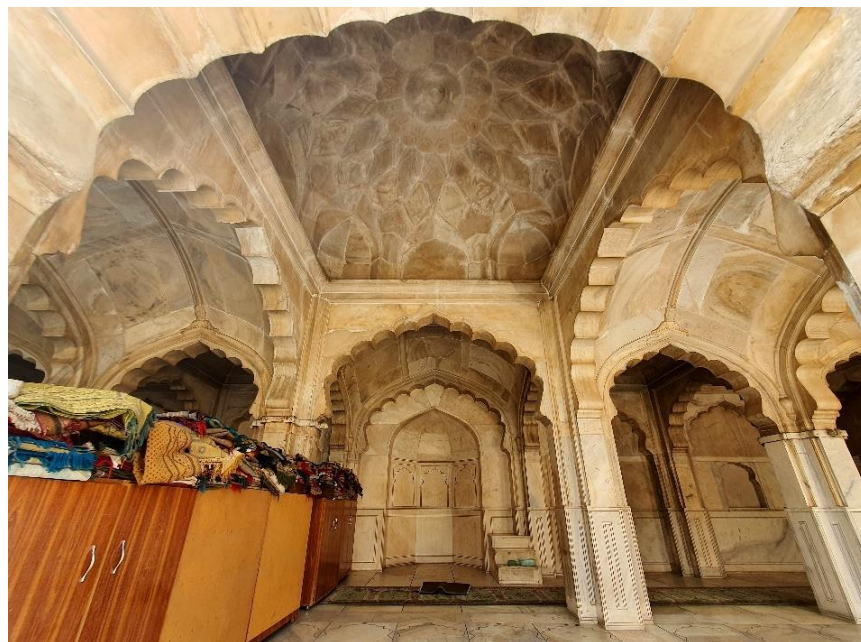


Figure 35: Stones lined skillfully on ceilings of prayer chamber of Motī Masjid.

The external outlook of the east wall of the mosque presented the same regular division of arches as of facade. Central arch that was pointed a little elevated where arches of the other side were lower multi-cusped arches and developed spaces for company to sit. Cusped divisions on both acute ends were recessed with doors. One

door was entrance, and other gave access to rooftop of the mosque. Technical skill was cautiously applied in the building of entire mosque structure. Plinths were constructed on the rooftop above the arches to balance out and reinforce the chambers. The stairway was built at the farthest right end of the eastern wall that gave an access to the roof of mosque. A constricted brickwork stairway leading to the rooftop was not illuminated, and the only source of light was sun. Every step of the staircase was built with sandstone (Nath 1982).

Motī Masjid was built with three lightly puffed-up domes that crowned the splendid building of the mosque on the top. Domes were placed on a curtailed barrel to hang on to capacity, which was a customary mark of Mughal architecture. All domes were built symmetrically unbiased, yet the middle dome was set on a raised podium to grant it a raised level. They were made up of the same perfect marble. Moreover, it was separated into four fine sections counting lotus bottom, and out of higher three, two were in a circle, and apex was pointed conical. Expertise in stone carving was superb.

Begum Shāhī Mosque, Lahore

The Mosque of Maryam al Zāmānī Begum was constructed from 1611 to 1614 A.D during Jahangir's era and was commissioned by him. It is placed near the Mastī Gate, in Lahore city. The design of this mosque was considered as the draft for the construction of Wazīr Khān Mosque and Badshāhī Mosque later, due to its innovative feature of five-bay chamber for prayer. The mosque was built by Jahāngīr in honour of his mother, Maryam al Zāmānī. This mosque was the chief masjid to the members of the court at that period.

The mosque of Maryam Zāmānī Begum is another example of an intermediary phase of Mughal architecture, from red sandstone to white marble. It was designed and constructed in such a way that both Mughal architectural traits and elements of previously Pashtūn, Lodhī Dynasty, were incorporated. Construction of wide arches and low domes in the Mosque was Lodhī style while Mughal design was exhibited by the vast balconies, side quarters, and ornamentations on the exterior and interior of the mosque (C. B. Asher 1992).

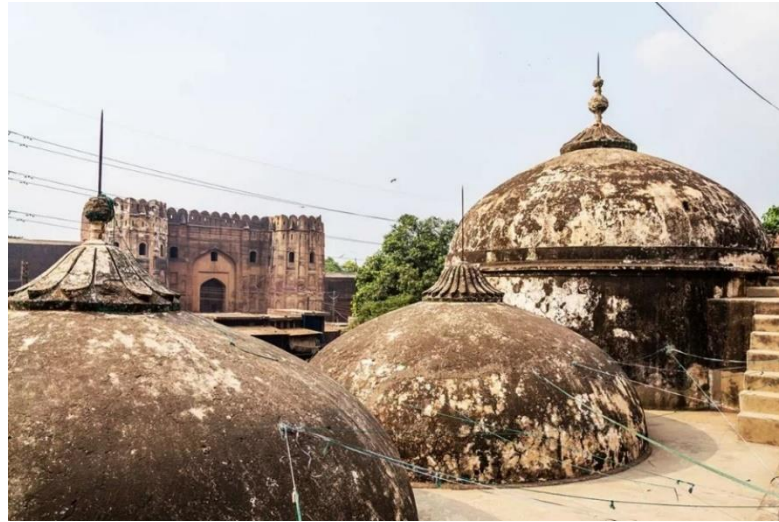


Figure 36: An Array of Domes on Begum Shahī Mosque Lahore.

Source: “Begum Shahi Mosque, the Mosque of Maryam Zamani: Indian History, Historical Facts, History.” Pinterest, April 18, 2020. <https://in.pinterest.com/pin/460422761908431584/>.

Dimensions of the mosque were kept considerably large. The prayer chamber was 130’ in length and 34’ in width. This chamber was separated into five bays above, which were three arches. The central bay was largest arch among the three. Moreover, a courtyard with 128’ in length and 82’ in width was also built. In this courtyard, an ablution area was built in the form of a pool. The interior of the building was decorated with comprehensive fresco work, which was a distinctive Mughal feature of Jahāngīr’s era as well. The frescoes were mostly of flowery patterns. Walls were carved with calligraphy of Quranic as well as non-Quranic verses. The Begum Shahī Mosque was the first mosque in Lahore with such extensive work of frescoes above the wall of white marble. (see Figure 37) (Latif, Lahore: Its History, Architectural Remains and Antiquities 1892).



Figure 37: Polychrome Frescoes Ornamentation inside Begum Shahī Mosque Lahore.

Source: Anjana. “Begum Shahi Mosque, the Mosque of Maryam Zamani.” Notes on Indian History. Blogger, <https://www.notesonindianhistory.com/2020/04/begum-shahi-mosque-mosque-of-maryam.html>.

Inscriptions in the mosque were in Calligraphic form with both Qur'ānic and Non- Qur'ānic derivation. On the gate of north side, an inscription was written in Persian with words: “God be thanked through whose grace, under the auspices of His Majesty, this building was completed.” The founder of the edifice, the place of salvation, is Queen Maryam al Zāmānī. For the completion of this edifice, which resembles paradise, On the gate of east side, an inscription was carved in words: “May the Conqueror of the world, King Nūr al-Dīn Muḥammad, shine in the world like the sun and moon, oh God!”.

Shalimar Bāgh, Srīnagar

Shalimar Bāgh is a very well-known garden that was constructed during the Mughal Reign in the subcontinent. Thus, it is also referred as a Mughal garden. It is located in Srīnagar, a city in Jammu and Kashmīr (see Figure 38). The garden is also called with various names such as Shalimar garden, Farah Bakhsh or Faiḍ Bakhsh. This garden was constructed on the order of Emperor Jahāngīr's for Nūr Jahan, his beloved wife and consort as a token of love and affection. It was constructed in the year 1619. This garden was connected to a lake, Dal Lake, by a channel which is located in the northeast. Garden is located at very high point from the ground level and is also called the Crown of Srīnagar due to its highest location. Another garden is also present in the surrounding of this garden which is known as Nishat Bāgh meaning “the garden of delight.”



Figure 38: Shalīmār Bāgh, Srīnagar.

Source: “Shalimar Garden.” Kashmir is Paradise. <https://ishfaqullah.weebly.com/shalimar-garden.html>.

Mughal gardens are the types of gardens that are associated with ruler Jahāngīr as it was during the rule of Jahāngīr who developed a certain type of gardens that are

now known as Mughal gardens. It is to be noted that the history of this garden is quite ancient as it can be related to the reign of Prāvarsena II back in 2nd century A.D. Srinagar was the city whose foundation was laid by Prāvarsena II during his reign in Kashmīr. He ruled Kashmīr for about fifty-year 79 A.D to 139 A.D. At the northeast end of the lake, Dal Lake, a cabin was constructed by Prāvarsena II, where he used to reside during his stay. The name Shalīmār was given by him to that cottage. In the Sanskrit language, the word Shalīmār meant habitat of love. During the visits, the king used to stay in the respective cottage and was very much impressed by the beauty of area. Later, the cottage was deteriorated and was unable to be located but the name of the place remained, and from then, the place was known as Shalīmār.

Jahāngīr was truly enchanted by the natural beauty of this place and commissioned the construction of garden as this place. This construction was dedicated to the wife of emperor Jahāngīr. In 1619 previous garden built by Prāvarsena II was enhanced and rebuilt into a new form that is still intact today as Shalīmār Bāgh. After Jahāngīr, the garden was further extended and by the governor of Kashmīr on the command of emperor Shāhjahān in 1630. It was Shāhjahān who named this garden as Faiḍ Bakhsh. It was a grand project by Jahāngīr, and he was much devoted in this construction and later become the residential place for the Emperor and the royal court whenever ruler Jahāngīr travelled and visited Kashmīr. It was evident that ruler admired the location due to his frequent visits during his reign.

Later, this place became under the rule of Sikhs governors who utilized it as their enjoyment place. The white marble porch was utilized as the visitor's quarters for the visitors of Europe during the reign of Mahārāja Ranjit Singh. Therefore, with the passage of time and under the rule of different governors, the garden was enhanced and comprehended. The name of garden was also changed by different rulers as they named the garden according to their desire and fascination, but the one name remained famous till today that is Shalimar Bāgh. This particular spot has inspired many rulers throughout the history and was most admired picnic point for them. For instance, during the reign of Jahāngīr, he along with his wife Nūrhān were so captivated by Kashmīr that during summer season, they used to visit this place. At least thirteen times or more, they move to Kashmīr from Delhi along with their court, and throughout the summer, state matters were handled from this place. Therefore, Srinagar was considered as the regal residency of the royal family along with court members during summer even though they had to cross the heavy snows

and snowy peaks and mountains along their way to Kashmīr on elephants (Makki 2020).

Persian gardens are the Islamic type of gardens that are known for their beauty and style; therefore, the plan of Shalīmar Bāgh was an alteration to this Islamic garden which gave birth to a new type of gardens. These gardens contained all the classic elements of Persian style garden blended with new reforms and some transitions in the design. The land over which the construction started was a plane and even piece of ground that was square, and this quadrangle sketch has four searing branches from the centre. The centre was the water source. Modifications and improvements were made because of high mountainous grounds and the need of well that could divert the water from high point to the planes of gardens, which was an important matter. Therefore, a chief central canal was built to provide the water. This channel was axially laid in the garden that ran from the elevated point to the lowest one. The central canal was named as Shāh Nihar. It was the chief and central alignment of the Bāgh (see Figure 39). Three terraces were built, and this channel followed through these three terraces. This modified plan of garden made the shape rectangular rather than square because radial branches were left out.



Figure 39: Central Water Canal that runs throughout Shalīmar Bagh.

Source: “Shalimar Garden.” Kashmir is Paradise. <https://ishfaqullah.weebly.com/shalimar-garden.html>.

The garden thus has area of 30 Acres with a length of 1925’ and a width of 820’. Shāh Nihar was the chief central canal that feeds the terraces. These three terraces were built and adorned with fountains and trees; these trees were chīnār, the featured tree of the area. Every terrace of these three terraces has a particular and specific function. For the need of water, the garden was connected to the open water of Dāl Lake by mean of a chief passage that was approximately 5280’ in length. The

width of the canal was kept 36', and the water canal flow through swamps to reach the garden. White marble-built terraces were at the edge of the lake. Lush green pathways surrounded the lake with chīnār trees grown in columns and lines around the lake. The garden was constructed with walkways that lead to various pavilions and avenues of trees planted at every short interval (see Figure 40).



Figure 40: Pavilions built at intervals of Shalīmar Bāgh.

Source: "Shalimar Garden." Kashmir is Paradise. <https://ishfaqullah.weebly.com/shalimar-garden.html>.

Each terrace was constructed with fine architectural details that hinted the style of emperor Jahāngīr. The initial terrace was made a community garden and was an external garden that came first. This garden concluded towards the community hall of audience called Dīwān-i 'Ām. A throne made up of black marble was constructed in this hall above the cascade. Moreover, another comparatively broader terrace that came second in the row was built down the length of central water channel. This terrace has further two terraces that were shallow. In the mid of this terrace was the hall of private audience called as Dīwān -i Khāṣ. This hall was specified and available only for the guests and members of the imperial court. This hall is now in ruins and is neglected. A good-looking raised stage enclosed by fountains and the stone bases that were carved adorned this hall. On the edge of this fountain enclosure, in the North-West direction, royal bathrooms were built.

Among the three terraces, the third one has Zenana Bāgh, and their water ran through the area from the central channel. It is also surrounded by Dīwān -i Khāṣ and trees, specially chīnār tree in abundance. Two guardrooms or pavilions were built at the main entrance of this terrace. These pavilions are small and are constructed in typical Kashmīr style upon the plinth made up of stone. This entrance was limited and

restricted towards the royal harem. In later years, a Bārādarī consisting of black coloured marble was installed by emperor Shāhjahān which was called as black pavilion present in the Zenana Garden. This terrace was surrounded by a spring pool which attained its water supply from an elevated terrace. A wall was carved with niches that were small. A dual waterfall falls over this slightly low wall that was present just at the back of entrance pavilion. From there, two secondary water channels that were smaller flow towards Bārādarī from the black pavilion. The end wall of the garden was distinguished by the dual octagonal-shaped pavilions present above the third level. A breathtaking background of snowy peaks of mountains adorned the Bārādarī, which was recommended as the perfect view for a garden.

Chīnī Khānas or niches were the characteristic feature of Shalīmār Bāgh along with refreshing fountains and waterfalls. These arched niches. Behind the waterfalls were further illuminated by oil lamps at night-time that provided the much-appreciated imaginary appearance of fairy tales. However, at present, the oil lamps are replaced by flowerpots, and the colours of these flowers is mirrored in the falling water of cascades. Among these unique features, another prominent architectural feature is the doors of Bārādarī. Four wonderful doors made up of stones were installed in Bārādarī that were balanced by pillars. These stones are considered as the remains of ancient temples that were destroyed before the construction of Bāgh. Various fountains were provided water from the large water channels in the garden.

Shalīmar Bāgh was indeed a breath-taking project, and it inspired every visitor in a unique way as in one of the chronicles its beauty was described in following words, “A subtle air of leisure and repose, a romantic indefinable spell, pervades the royal Shalimar, this leafy garden of dim vistas, shallow terraces, smooth sheets of falling water and wide canals with calm reflections broken only by the steppingstones across the streams.” Still, after the Mughal period throughout Mahārāja’s reign, the gardens were kept under care and protection with maintenance and continuous rehabilitation that even at present, this place is one of the famous tourist attractions in the region of the Dāl Lake. The garden depicts in beauty and charm, specifically during the fall and spring seasons due to the transitioning in colours and shades in leaves of the famous chīnār trees (Villiers-Stuart 2008).

This garden is considered as the draft for the construction of other famous gardens with the same name and style during the reign of following rulers after Emperor Jahāngīr, such as Shalīmar Bāgh in Delhi that was constructed in 1653 along

with Shalīmār Bāgh in Lahore that was constructed in 1641 under the command of ruler Shāhjahān. The style and architecture of these gardens is similar to Shalīmār Bāgh and are the inspirational gardens that enhance the importance of the style of Shalīmār Bāgh, Srīnagar. There are various inscriptions on the surfaces in the Persian language. For instance, the black pavilion that was constructed during the early years of Jahāngīr's reign has an inscription in Persian on the top terrace of the Bagh that follows the wording,

“Agar Firdaus bar rōy-e zamin ast,
hamin ast-o hamin ast-o hamin ast.”

This means “*if there is to be any heaven on the planet earth, it is here, it is here.*” This is a famous duet by Amir Khusrau, who was a renowned poet. Many other couplets by this poet were also inscribed on various other structures in the subcontinent built during the Mughal period. Emperor Jahāngīr was fascinated by the beauty of Kashmīr, and he considered it as a heaven on earth.

Pathar Masjid

Another prominent structure built in Kashmīr in the rule of Jahāngīr was Pathar Masjid. This mosque is still completely unbroken, and the different intervals of time and harsh weather conditions did not affect this building. It was built during the reign of Jahāngīr by his wife, Nūrbahān. In 1620 A.D, it was custom-built in the management of Malik Haidar Chaudhary. It is also to be mentioned that this structure was abandoned entirely by the scholar of archeology. It is also concluded that because of offensive remarks of the empress about this structure, the mosque was not given much importance and remained in the shadows for a long time. Still, slight references can be traced out from different books, but a detailed account could not be developed at present unless the mosque is not seen. It is said that someone asked Nūr Jahān about the actual amount spent on the mosque. She pointed to her shoe, and it was decreed that the mosque should not become a place of worship, and up to recent times, it was not used at all. It is a myth or fact, cannot be declared without further research.



Figure 41: The Façade of Pathar Masjid.

Source: Gura, Khalid Bashir. "Cast in Stone." Kashmir Life. Kashmir Life, <https://kashmirlife.net/cast-in-stone-issue-39-vol-12-256059/>.

The Pathar Masjid indicates from its name that it was purely made up of stone (see Figure 41). It is situated on the left side of the River Jehlum, almost on the opposite side of the Shāh Hamadān Mosque. The whole interior and exterior of the Mosque are made up of limestone of bluish colour. There big stone pillars or huge stone panels cannot be traced down, but delicacy dominates everywhere. The least attention was paid to ornamentations and decorations of the mosque. The provincial style which cannot be traced in other such Mughal buildings but some of the scars of the local style still can be noticed. The fired bricks and lime have been used, and the main structure of the building is of the same material but has been covered with stone, and it seems to be a stone structure only.

The mosque is spread over an area of 9720 SFT. The entire compound is studied with stone. The interior part is divided into three passages by two massive stone arches which extend from one end to the other. The roof of the compartments between them being beautifully ribbed and vaulted. The façade comprises of 9 arches and a large compound-style arch in the center. The various capitals, which gained some importance during the Mughal period, possess a number of mosques and, although having a typical style of their own yet bear the common feature; the domes and the minarets. This was a common feature of all Indo-Islamic buildings, whether private or civic ones. However, we feel some diversion from this tradition, and the Pathar Masjid or Masjid of Hasasan does not bear any Dome, and minaret. The Pathar Masjid was the last of the buildings of Jahāngīr.

Jahāngīr's Quadrangle

Among many structures in Lahore Fort, Jahāngīr's Quadrangle was also built on the northeast end of the Lahore Fort. It was named after Jahāngīr, and construction had started at the order of Akbar. However, its construction finished many years later in Jahāngīr's rule. The style building was distinguished in the quadrangle with the design of brackets that were columns shaped and were engraved by the shapes of different fauna. The architectural design of the Bāgh is different from other Mughal gardens, which were inspired from the style of a Persian garden. It was built by rectangles with a cascade in the middle.

Lahore Fort is considered as a limitless area when it is explored and search. It is one of the famous tourist attractions due to remarkable structures and buildings of architectural importance that provide knowledge of building art of the Mughal period. Lahore was an inspirational city throughout the reigns of different rulers. They left their signs on the city by building wonderful structures that still at present speak volumes. The admiration and fascination of former rulers can be observed by massive architectural designs that tell the times and periods that the ancient city of Lahore has seen. In Pakistan, Lahore Fort can be considered as the only monument that goes through the rules and stands witness of all rulers who took the throne of Lahore.

Starting from the main gate and the leading areas such as picture wall, mirror palace, hall of public audience, Ath Dara, Kāla Burj along with the dark dungeons, kitchens for the royals moving to Akbari Gate, Ālamgīri Gate, and Mūthamman Gate, all these structures depict the different eras under the rule of different cultures and religions including Muslim, Sikh, and Christians. Moreover, all these structures are the marks and symbols left by their owner that demonstrate the stories of past, hardships, affections, crest, and trough of lifetime. Thus, they are a limitless world of legends and sagas. These legends provide hints to the culture, art, and architecture inspired in the rulers of that time as well as influences and source of inspiration for such architectural wonders.

Among various wonders lying in Lahore Fort, one of them is Jahāngīr's Quadrangle which is situated just behind the hall of public audience which is known as Dīwān-i 'Ām. Jahāngīr's Quadrangle is surrounded by refreshing green grass, gardens along the way with cascades and springs. During the season of spring, the beauty of these structures enhanced due to the flowers and blossoms and, most importantly, the sparkle of sprinkling water that appear as gems under sunlight. This

natural beauty holds the interest of visitors. The Jahāngīr's Quadrangle was constructed as a massive assembly of structures in Lahore Fort, and it is possibly the most famous one as well as most abundantly visited by hundreds to thousands of tourists and visitors each day.

The most distinctive feature of this Quadrangle is its various glorious, gigantic, and magnificent buildings that are tempting and are architectural masterpieces in themselves, which depict the precision and perfection of labor and craftsmen of that era. It leaves no doubt in the minds of the viewer that indeed, the craftsmen of that time were perfect in their art and work. The certainty and precision of their hands created such wonders. The prominent structures of Jahāngīr's Quadrangle are Sih Dari, (see Figure 43) sleeping chamber or Bari Khawābgāh, Harem, Dālān and areas containing fountains.

Bari Khawābgāh, which also means large bedroom, is situated on the north side of Quadrangle. It was the sleeping Chamber of Jahangir during his reign and was a residential area (see Figure 42). The present building was the version that was rebuilt by the British government for rehabilitation purpose. Moreover, now it is utilized as a Museum consisting of different Mughal period material for display.



Figure 42: View of Bari Khawābgāh in Jahāngīr's Quadrangle.

The history of this Quadrangle tells that the creation of this section Jahāngīr's Quadrangle started by order of the Mughal Emperor Akbar; however, it was finished by emperor Jahāngīr from 1617 to 1618. The cost of this place is estimated to be 700,000 rupees of that time which proves to be quite a generous sum at that period. This structure was made by the use of red sandstones that is why it is also believed that the sand-stonework that exhibits the animal figures and parts are the architecture of ruler Akbar as it discloses his advancement and leniency for other religions, most

specifically Hindu religion and its motifs, which was a basic trait of Akbar's era and greatly influenced his architectural style and design.

From the east to the west end, Jahāngīr's Quadrangle is bordered by dālān. These have unique architecture as their front was built with red sandstones along with columns that were carved and detailed brackets for various animals' figures such as elephants. This architecture is a unique and distinctive model for carved stonework which is not common in other Forts of Pakistan. In the inner section of Quadrangle, a large tank of water was built that was present in the center along with the many cascades. These fountains are still functional after many years of construction of these structures due to the restoration of the fort by authorities, and during the summer as well the season of spring, these fountains provide a refreshing view. At the center of the tank, a marble-made platform is present that is square in shape and is called Maḥtābī. It contains a low basin along with fountains made up of marble. These various fountains run in the tank and provide a livelier environment in the Quadrangle.



Figure 43: Sih-dari inside Jahāngīr's Quadrangle, Lahore Fort.

Chapter IV

Phase-III; White Marble (Shāhjahān Period)

Shāhjahān is considered as the Architect king and his ruling period was of ultimate magnificence. During the Shāhjahān's reign, various structural monument was erected. Ancient Delhi was surrounded by fortified boundaries in the form of walls. Just inside the heart of Delhi, Shāhjahān constructed a glorious palace for his use that was enclosed within the Red Fort. This fort was further comprised of many buildings for royal purposes along with this specific palace (Nicoll 2009).

A marvellous throne known as the Peacock Throne was a custom made for Shāhjahān. The distinctive character of this prestigious throne was gilded surfaces sheltered with precious gemstones. European annalist approximated the expenditure for the manufacture of this royal seat for the ruler was above 832,500,000 rupees in Pakistani currency today. In 1739 A.D, a Persian invader attacked Subcontinent and set fire to the palace of Shāhjahān and stole the Peacock Throne. He relocated the throne to Persia and used it during his reign; as a result, throne remained in Persia. Moreover, this throne was shattered and smashed into pieces to gain precious jewels and gold. This throne was the one that incorporated a famous diamond Koh-i Nūr of 186 carats (Eraly 2000).

In 1592 A.D Shihāb-al Dīn Muḥammad Khurrām was born in the city of Lahore. He was the third male child of Jahāngīr, and his mother Balqis Makani was a Rajput princess. The name Khurram was given by Akbar to his grandson; the word Khurram means Cheerful. Shāhjahān was very close to his grandfather, emperor Akbar. Therefore, they shared a close relationship. Akbar was impressed by the skills of his grandson. Ruqaiyāh Sulṭān Begum was the chief consort and first wife of Akbar. She had no children; hence she was unable to provide a successor to the Mughal empire. However, one of the fortune-tellers informed her about the bright future of the unborn prince. Consequently, after the birth, Khurram was given to Ruqaiyāh Sulṭān on the order of Akbar as he wanted his grandson to be raised by his first wife instead of the prince's mother. Ruqaiyāh Begum desired to at least raise an emperor for the Mughal Empire. Therefore, to fulfil this wish, Akbar handed over the young prince to Ruqaiyāh Sulṭān. (Nicoll 2009)

Ruqaiyāh Sultān took responsibility and raised the prince with affection and concern. They both developed an immediate connection as a son and mother. In his autobiography, Jahāngīr also mentioned as Ruqaiyāh had cherished his son, Khurrām, almost a thousand times more than her son if she had any. (Nicoll 2009).

Shihāb-al Dīn Muḥammad Khurram is now remembered with his reign name Shāhjahān. He was the fifth Mughal of the Indian Empire. He is extensively considered as an eminent Mughal emperor. During Shāhjahān's period, the territory flourished and touched the heights of prosperity and glory. Shāhjahān was a military Commander as well, but he is mostly remembered for his magnificent architecture. He contributed to the field of architecture with the construction of glorious buildings. Therefore, the gilded age of Mughal architecture was the reign of Shāhjahān. He commissioned numerous monuments, and Tāj Maḥal is the most splendid of them all. It is the burial place of his wife, Mumtāz Maḥal, and he was buried later alongside her grave (Nicoll 2009) .

Shāhjahān was well-thought-out as a proficient son among other males offspring of Jahāngīr. After the demise of Jahāngīr, a series of battles started among his sons, and in the end, Shāhjahān won. All his opponents were put to death that competed for the throne. Later Shāhjahān crowned himself as a ruler in the city of Agra with his reign name Shāhjahān. during his reign empire faced hostilities with Safavids and Portuguese. However, constructive relationships were developed with the Turkish Ottoman Empire. One of the major challenges faced by Shāhjahān was a frequent rebellion which was a real threat against the peace of the empire. (Farooqi 1989)

In September 1657 A.D, Shāhjahān fell seriously ill. Consequently, a battle called war of succession started among his sons. In the end, Aurangzīb won the battle. After his recovery from sickness, Aurangzīb imprisoned his father, Shāhjahān, at Agra Fort. He was buried honourably in Tāj Maḥal, with his grave situated next to the grave of Mumtāz Maḥal. The architecture of Tāj Maḥal was planned by immense heed and thought. Architects from different famous regions were asked for this project. The construction took almost two decades to finish. (Middleton 2004).

Following are some of the significant structures by Shāhjahān that are now heritage sites:

The Mahābat Khān Mosque

The Mahābat Khān Mosque is a Mosque that was built during the Mughal period in the seventeenth century in the city of Peshawar which is present today in Pakistan (see Figure 44). It was constructed in the year 1630 A.D. During the reign of Shāhjahān, Nawāb Mahābat Khān bin ‘Ali Mardān Khān of Peshawar was appointed as the governor of this respective city. Governor was also known with the name of Mahābat Khān as well as ‘Ali Mardān Khān. Therefore, this Mosque in the city of Peshawar was named after him as Mahābat Khān Mosque. The Mosque is unique in its architecture that fascinates the viewers and depicts the architectural splendour of Shāhjahān’s period. The Mosque is one of the remarkable and important historical points in Peshawar. It was typically made with white marble, which was a distinctive feature of Shāhjahān architecture. The white marble fascia of the Mosque is eye-catching and enchanting (Nadiem, Peshawar: Heritage, History, Monuments 2007).

Even after the first construction, this Mosque has gone through different periods under the reign of various other invaders. The construction of the building was planned on the uppermost plane of the city. This place was the highest point. It was further expanded from 1660 to 1670 A.D. During the Sikh reign, the prominent minarets of the Mosque were commonly used as the hanging pillars for the captives. The use of minarets for punishment was so frequent that almost five or more people were hanged to death each day. This changed the status of the Mosque from a place of worship to the execution point or gallows. Afterwards, when Afghanistan was under the raid of the Soviet Union. Mosque was used as the meeting place for the leaders of tribes to assemble and create unity against the invaders among different tribes of Afghanistan.



Figure 44: Outlook of Mahābat Khān Mosque.

Source: “Mahabat Khan Mosque Restoration Far from Over.” The Express Tribune.
<https://tribune.com.pk/story/2324572/mahabat-khan-mosque-restoration-far-from-over>.

The layout of the Mosque is square planer; it is about 3155 SFT in area. The courtyard is open and located in the center of the building, with the area of ablution in its middle. Rooms were built in a single line that was facing the exterior walls of the Mosque. The façade of the building was entirely built with white marble, which was the prominent feature of *Shāhjahān* buildings. The interior of the Mosque was ornamented with characteristic frescos of Mughal period interior designing. From walls to ceilings, the surfaces were decorated with flower-patterned motifs and bright coloured frescoes, all in a symmetric fashion. Thus, both the internal as well as external panels of the Mosque were decorated with vegetal motifs and calligraphy of verses of the Quran frequently (Shinwari 2008).

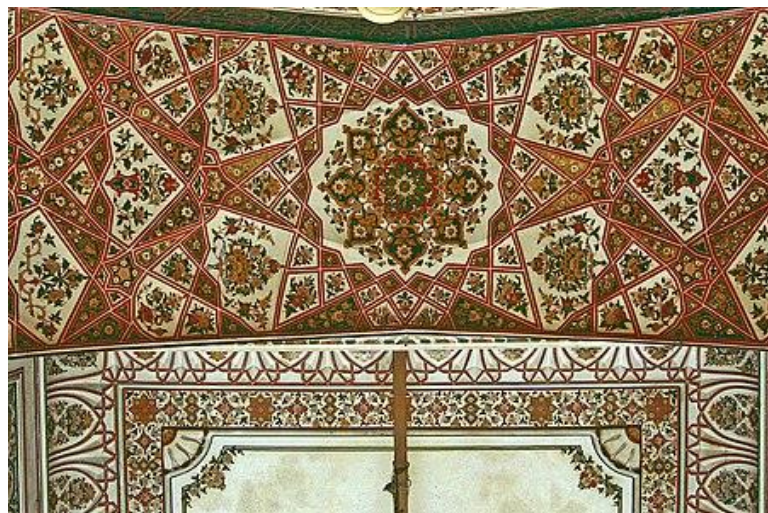


Figure 45: Bright coloured frescoes with floral motifs on the ceiling of Mahābat Khān Mosque.

Source: “Mahabat Khan Mosque.” Wikiwand.
https://www.wikiwand.com/en/Mahabat_Khan_Mosque#Media/File:PeshawarMahabKhanMosch.jpg.

On the western side of the Mosque hall of prayer was built. The hall was crowded with two high and long minarets. These minarets were separated into three different portions. The pretence of the hall for worship was also covered with six relatively smaller attractive minarets that border the five arched entrance of the Mosque all along with supplementary two minarets neighboring the set of six smaller ones. Further, this hall of prayer was also crowned with three domes marked by grooves. The roofline was raised from the outer boundaries and towards the center by a succession of four petite incremental heights. The ceiling was inflated with numerous crenellations. The apex of the Mosque's white marble outlook was crowned by curved in moulding that approximate a quarter circle called cavettos.

Moreover, five arched entrances offered to open into the main hall of prayer. The mid arch was the longest and characterized by a curved arch usually of the Mughal style. On the adjoining sides, this middle arch was continuous with two to some extent shorter arches that were not cusped and were styled in the Persian and Subcontinent architectural style. These arches were further linked by a minor arch adorned analogously, and a chain of seven little curved portals was established on top of each arch. The three middle arched portals were embroidered with muqarnas above the string of seven-minute arched portals. The outmost arches were ornamented with *ghālibkāri*, called a complex net of ribs made of stucco and plaster that was applied to bent surfaces of the archways for enhancing ornamental attraction (see Figure 45). Different attractive motifs that were floral in style adorned the archways of the Mosque beside the upper curves; these motifs were multi-coloured (A. N. Khan 1991).

Shāhjahān Mosque

The Shāhjahān Masjid is also referred to as the Jamia Masjid of Thaṭṭa. It is another example of seventeenth-century construction. This Jamia Masjid is still a main Mosque for the city. This Mosque is situated in Thaṭṭa city, Pakistan, in the Sindh province (see Figure 46). The Mosque is considered to have the most detailed demonstration of the work of tile in the Subcontinent. It is also noteworthy due to its geometric tilework. Tilework was a decorative constituent that was bizarre for the Mughal period Mosques. Construction of this Mosque started under the rule of Shāhjahān who gifted it to the town as a symbol of appreciation. It was profoundly inspired by the architecture of the Subcontinent. It is also referred that this Mosque was a mirror image of Shāhjahān's structures built during his campaigns near

Samarkand in a while just before the Mosque was planned (asian historical architecture 2020).



Figure 46: The Outlook of Shāhjahān Mosque Sindh.

Source: "Thatta." TrekEarth.

<https://www.trekearth.com/gallery/Asia/Pakistan/East/Sindh/Thatta/photo1535427.htm>.

In the 16th and 17th centuries A.D, under the Mughal Empire, Thaṭṭa was privileged to be the capital city of Sindh. Later the capital was changed to be another city, Hyderabād. This Mosque was built on the very east end of the city. At present, this place is about 100 km away from the city of Karachi. Shāhjahān sought a place of safety in Thaṭṭa from his father, Emperor Jahangir as he had rebelled in opposition to his father. Shāhjahān was overwhelmed by the generosity he got from the Sindh natives and planned the creation of the Mosque as a gesture of gratefulness. The structure of the Mosque may have also been, to some extent, trigger off an aspiration to facilitate the aftermath of a distressing storm of 1637 A.D that impacted the province, and it had almost ruined Thaṭṭa (ASHER 1992).

Shāhjahān's campaigns in the subcontinent throughout this period inspired the architecture of the Mosque. The style depicts Timurid inspirations that were incorporated into the Mughal Empire as his forces pushed towards Samarkand. Although the ruler was not in the province during its building and was not likely directly caught up in its building, its abundant brickwork and elaborate tilework specify that it was commissioned by the Mughal's imperial treasury. Numerous Persian language inscriptions at the Mosque showed that it was constructed from 1644 to 1647 A.D through the supremacy of Mughal Emperor Shāhjahān. Unfortunately, at first, the mihrāb of the Mosque was not correctly associated with Mecca. Later, a Sūfī named Makhdūm Nūh corrected the architects about the alignment with Khāna Kābah. The Sūfī is now buried in the city of Hāla, which is near the Mosque (NAEEM 2015).

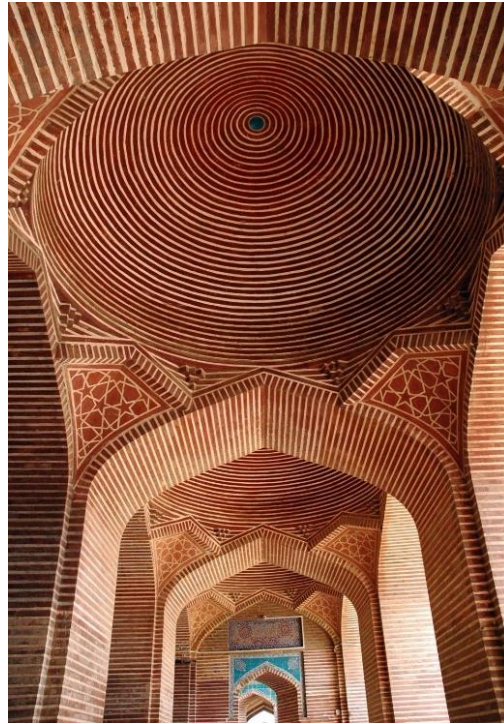


Figure 47: Interior of Shāhjahān Mosque Sindh.

Source: “Thatta, Pakistan: Brick Architecture, Mosque, Shah Jahan Mosque.” Pinterest, January 6, 2018. <https://www.pinterest.com/pin/500462577334363876/>.

The Shāhjahān Mosque has a unique architecture. Its style was excessively inclined towards Turkish and Persian architecture. The building was featured by widespread bricks and mortar work and the use of blue-coloured tiles (see Figure 47). This work showed the direct influence of the Timurid style in the building of the Subcontinent. The abundant utilization of tiles was measured to be the most sophisticated exhibit of tilework in the Subcontinent. The Mosque utilized multi-colour of bricks such as blue, including cobalt shade of blue, turquoise, and violet, especially manganese violet and pure white (see Figure 48).

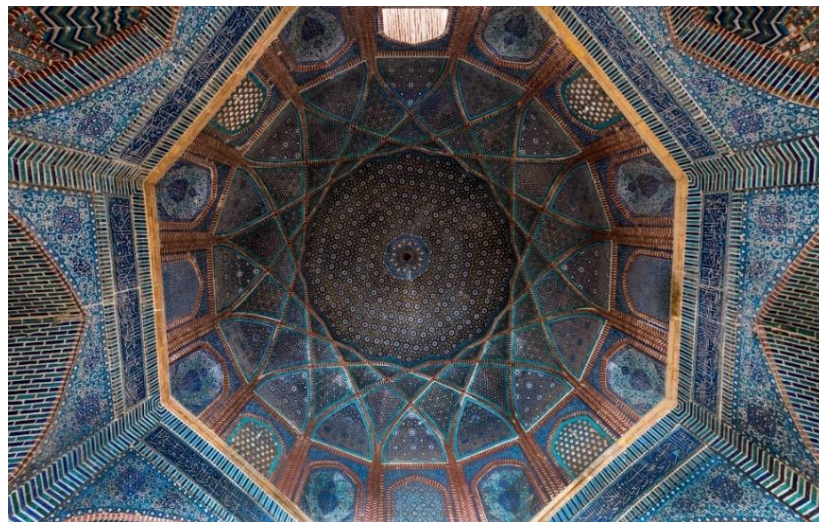


Figure 48: Multi-color Brickwork in the Shāhjahān Mosque, Sindh.

Source: “Shah Jahan Mosque - Pakistan.” Al Fozan. <https://asfaar.org/en/file/423>.

Dome at that time had become an essential architectural element for Mosque. Therefore, the dome of the Mosque was decorated with delicate blue and white tilework that was prearranged in stellated patterns as a representation of the heavens. Its ramparts were marked with tilework with calligraphy by ^ʿAbdul Ghāfūr and ^ʿAbdul Shāikh. The position and prearrangement of tiles depicted Persian inspiration from Safavids with numerous colours on a sole tile different from the tilework at other Mosques by Shāhjahān, which used a particular colour on each tile. The features of the Mosque include extensive brickwork laid in an asymmetric geometric manner which is an attractive element atypical for Mughal period Mosques but is a prominent factor of Timurid architecture used in the Mosques of that period. This frequent brickwork was also inclined by Sindhī dialect styles, which were prejudiced by the Persian style of architecture. Brickwork is most noteworthy in the arcades neighbouring the middle courtyard. While circular rings with the same center of bricks were utilized to adorn the base of marginal domes (A. N. Khan 2003)

The plan of the Mosque was also considered to be inclined by the conventional Timurid-style from Humāyūn Mosque in Kachpūrā, near Agra city. The chief entrance in the Mosque compound was built through a Persian-style Chāhārbāgh of quadrangle garden. The chief worship hall was on the west side of the middle courtyard, which was marked with portals on every four prime sides. The courtyard was a rectangularly shaped area which was calculated as to be one hundred and sixty-nine feet in length and ninety-seven feet in width. It was bordered by aisled galleries that were lined with thirty-three arches (A. N. Khan 2003).

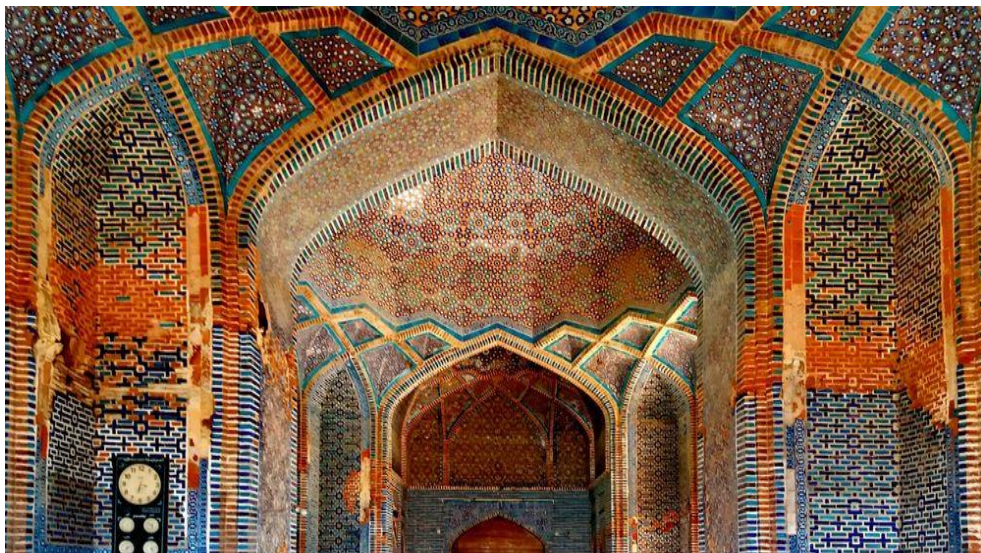


Figure 49: Arched Portals with geometric coloured tilework in Shāhjahān Mosque.

Source: “Shah Jahan Mosque -World Tourism Day Celebration Tour (Episode 1).”

<https://www.localguidesconnect.com/t5/General-Discussion/Shah-Jahan-Mosque-World-Tourism-Day-Celebration-Tour-Episode-1/td-p/2119954>.

The mihrāb of the Mosque had screens which were pierced, an ingredient that was normally in use on Mughal tombs or monuments but strange in Mughal Mosques. This Mosque possesses excellent sound quality like for instance, a person talking on one ending of the dome could be heard from the other ending whenever the vocalizations increase to a certain value. Therefore, prayer offered in the main hall of prayer can listen through the whole Mosque. Another unusual element is the lack of minarets along with a sum of ninety-three domes that are not present in any of the structures situated in Pakistan (ASHER 1992).

Wazīr Khān Mosque

The Wazīr Khān Mosque was built in the 17th century A.D with the locality in the capital province Punjab, Lahore in Pakistan. This Mosque was built along the south side of famous Shāhī Guzargāh, a road used by royals to reach to imperial residences within Lahore Fort. It was specially made in the period of influence under Shāhjahān to be a fraction of an assembly of structures that incorporated the close by Shāhī Ḥammām. In 1634 A.D, construction of Wazīr Khān Mosque started, and in 1641 A.D, it was concluded. It is now measured as a richly ornamented Mosque by Mughals. Wazīr Khān Mosque has popularity for its mosaic tilework, also called kāshīkāri (see Figure 50). The internal coverings were approximately fully embroidered in detailed Mughal period frescoes ("History and Background" Conservation of the Wazir Khan Mosque Lahore 2012).



Figure 50: The Outlook of Wazīr Khān Mosque, Lahore.

The Mosque was custom-built by the head general practitioner in court Hakim ‘Ilam al-Dīn Anṣārī. He was generally recognized to be Wazīr Khān. Later he became subedar of the province of Punjab and custom-made other numerous monuments in the city. As Wazīr Khān had a huge quantity of land next to the Delhi Gate, therefore, in 1634 A.D he commissioned Wazīr Khān Mosque to add-in grave of Mīrān Bādshāh, a respected Saint who’s grave is present within the main courtyard of the building. Early to the building of the Wazīr Khān Mosque, there was a shrine for the saint which was an old structure.

The internal design of the Mosque was splendidly overstated with frescoes that produce Mughal and domestic ornamental customs of Punjab. The external style of the Mosque was abundantly bejeweled with complicated Persian mode of kashīkāri tilework. Wazīr Khān’s Mosque outdated one of previous Maryam al Zāmānī Mosque and became the chief Mosque of Lahore. Wazīr Khān’s Mosque act as a fraction for a superior compound that incorporated the market’s chain conventionally set aside in favour of calligraphers and bookbinders (see Figure 51).



Figure 51: The highly decorated interior of Wazīr Khān Mosque with frescoes and calligraphy.

This structure was the first model of a purpose-built Subcontinent’s bāzār of four-axis even though as Wazīr Khān Mosque edition, a couple from these quad axes was associated to be entranceway of mosque and remaining pair figures the Bazar of calligraphers. With accumulation in a market’s string which created the calligrapher’s bāzār, this Masjid borrowed place from further people, from north and east side outlooks of the mosque. In 1634 working on the building of the structure commenced during the supremacy of Mughal ruler Shāhjahān and was finished around in seven years. The Mosque was constructed over a high plinth in such a way that the main doorway opens against the Wazīr Khān Chauk. Moreover, the peripheral boundary of

the Wazīr Khān Mosque has dimensions of 278' in length and 158' in width. The long axis was corresponding with Shāhī Guzargāh. It was constructed using bricks as a basic building material with an inlay of kankad lime. Wazīr Khān Mosque is distinguished due to prominent intricate adornments in such a manner that was inspired by ornamental customs of several regions. At the same time as other memorials in Lahore dated to Shāhjahān's phase are attributed with intricate kashīkāri tilework, not any of them contest with the massive extent of Wazīr Khān Mosque.

The outer surface of the Mosque was comprised of bricks which were opulently inflated with tile work of Muslim manner acknowledged as kashīkāri. The façade in front of the internal courtyard is luxuriantly embroidered with floral motifs and palettes, which exhibit tough influence as of the seventeenth century. Colours of Persian manner were also utilized, which are cobalt blue, cerulean, white, emerald, ginger yellow, and plum. Moreover, Persian styles motifs contain star fashioned flora and vines. This Mosque also comprises of logos of cypress trees (see Figure 52). It is to be noted that this was the earliest Mughal structure that has rented these ornamentations from Iran.

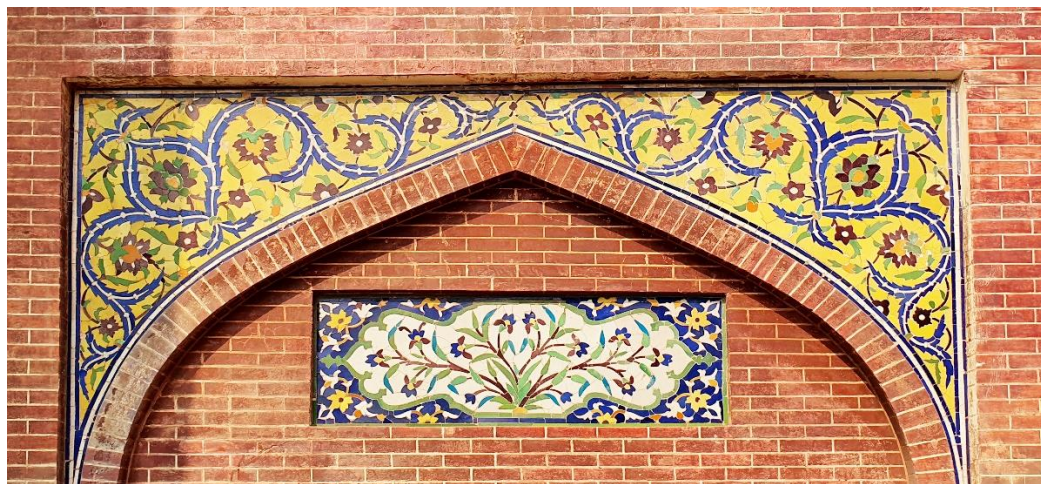


Figure 52: Tilework with Floral Motifs Wazīr Khān Mosque.

The façade of the entry doorway in front of Wazīr Khān Chowk was festooned by sophisticated tilework and calligraphy which comprises of verses of the Holy Quran, verses of the Hadith of Prophet Hazrat Muḥammad (s.a.w) along with dual for the Prophet. Over the entrance to the main hall for prayer were verses of the surah Al-Baqara from the Quran that was crafted by Hājī Yousaf Kaṣhmīrī. Contrasting the up to date Shāhjahān Mosque of Thaṭta, internal surfaces of Wazīr Khān Mosque were coated as well as bejewelled employing extremely comprehensive

frescoes. The internal décor scheme was exclusive for the Mughal era Masjids because a link was created between royal Mughal fundamentals with confined Punjabi ornamental styles by it. The main prayer chamber has a four-sided figure-shaped porch, above this porch; a chief and biggest dome of the Mosque is present. A Persian-style dome was constructed. It was also noted that the base of the dome was marked with frescoes. (Chahar Taq 2020).

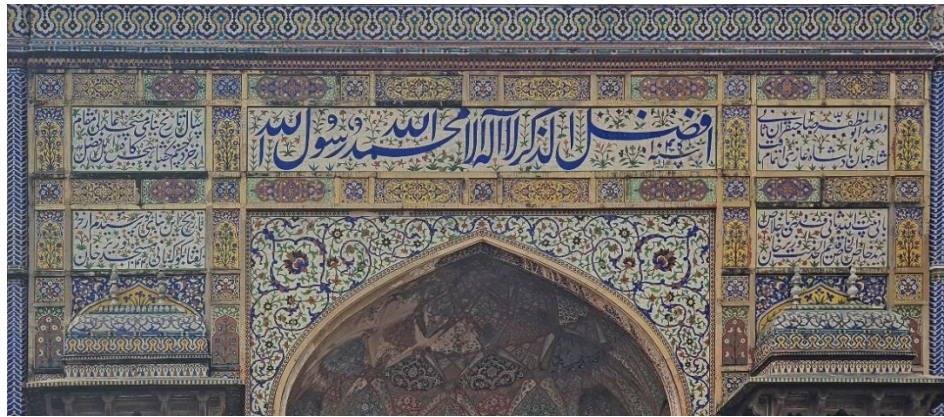


Figure 53: Calligraphy Work at Wazir Khān Mosque.

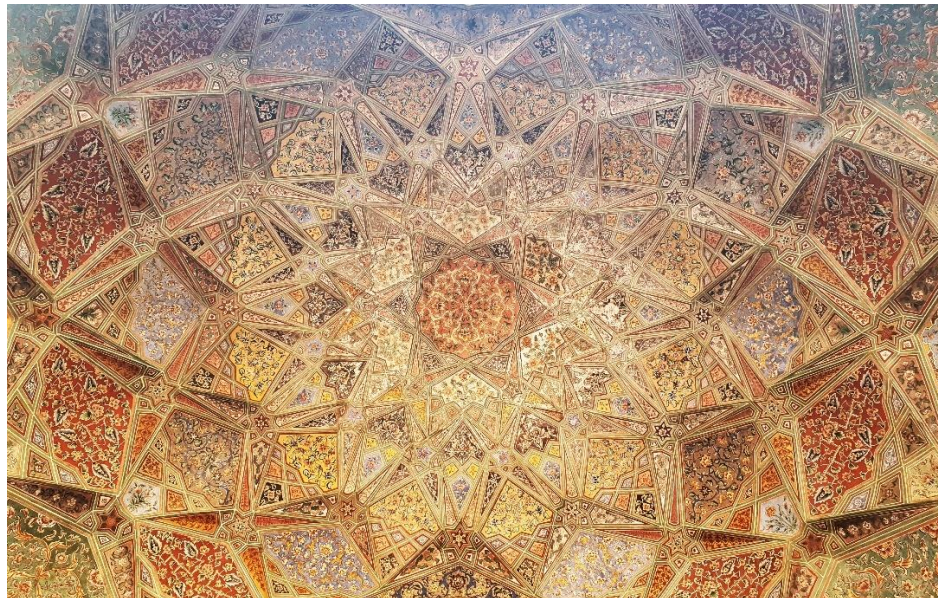


Figure 54: The Interior of the Mosque with heavy decorative frescoes and floral motifs.

The arched niche present at the entrance of the Mosque is in front of Wazir Khān Chauk and splendidly adorned with flower-patterned motifs and accumulated as one of the first examples of a muqarnas in Lahore. Originally it was a construction component originated from Spain used in Alhambra. It was also Practiced on some regal mosques constructed in Persia. Domes of this Mosque were low heighted situated above the main prayer chamber; depict an approach to the former Lodhī

dynasty who governed Subcontinent. Access in Wazīr Khān Mosque was provided employing huge Timurid style Īwān above the slighter doorway that faced the Wazīr Khān Chauk. This Īwān was adorned with a pair of extrapolative terraces. On top of this Īwān was an Islamic statement of belief in Arabic, printed within complex tilework. The panels neighbouring this Īwān hold Persian quatrains crafted with hands of Muḥammad Ali, a skilled calligraphist and pupil of Saint Mian Mīr. There was aboard in the right direction of Īwān , which as engraved with words:

“To all who turn towards the Qibla in prayer,
may this door remain wide open with
prosperity till the day of resurrection”.

Whereas another board opposite to the right one, just on the left direction of Īwān was engraved with words:

“Tillers! Everything we sow in this world we
will reap in the next. Lay a good foundation
in this life, for everyone must pass through
this gate to Paradise”.

An enclosed eight-sided compartment is accessed by a petite doorway that shows the way in. This eight-sided hall is present within the middle of the courtyard was the earliest case as Subcontinent’s chārṣū - bāzār theory, also called a four-axis bāzār, to be initiated in Subcontinent. Two axes from these four axes were associated with Calligrapher's bāzār, whereas the remaining pair of axes line up towards a direct column starting with the admission doorway of the Mosque towards the middle of the chief hall for prayer.

Openings from side to side, the doorway and octagonal hall lead into the central courtyard of the Mosque. The courtyard measures approximately one hundred and sixty ft by one hundred and thirty ft and has elevated vaulted corridors adjacent to a middle patio that was smooth by bricks. It is a unique Imperial Persian Mosque trait. A pool was installed in the court of the Mosque that was used for ablution. Dimensions of the pool were 35 ft in length and width. The patio features an unfathomable tomb that comprises a burial place of the fourteenth century Sūfī Sayyid Muḥammad Ishāq Gāzrūnī,(see Figure 55) also recognized as Mīrān Bādshah. This Mosque possessed four minarets situated on every four ends of the square patio where each one of them was one hundred and seven ft in height.



Figure 55: Tomb of Sūfī Sayyid Muḥammad Ishāq Gāzrūnī.

At the very west part of the site, a main chamber for worship is present, which measures just about 130' long and 42' in width. Further, this hall is separated into five segments allied in a single extensive passageway successively from north to south which is similar to the prayer chamber of the former Mosque of Maryam al Zāmānī Begum. The innermost segment of the main chamber for worship is capped with, thirty-one feet tall dome with a diameter of twenty-three ft latent upon four arches that form a square-shaped porch. It was another Persian architectural appearance called Chār-ṭāq.

Moreover, the residual partition of the chamber for worship is capped with a twenty-one ft high dome with a width of nineteen ft, constructed with a fashion parallel with the former Lodhī dynasty. The north side and south side sections also include petite cuboids; they reside in curved stairs which show the way towards the top of the roof. Internal surfaces of the worship chamber were ornamented through Calligraphy. Every fence was separated more so contained exclusive mosaic designs. Moreover, an auditory character established in the dome permits the imam's oration that can easily be anticipated from corner to corner of the Mosque's courtyard.

The Tāj Maḥal

The Tāj Maḥal, also referred to as the crown of the palace, is a marvellous whitish structure of pure white marble that is located at the southern reservoir of Yamuna River in the historic town of Agra, India. This structure was custom-built under the order of Shāhjahān in 1632 A.D. It accommodates Mumtāz Maḥal's grave;

a dearly loved spouse of Shāhjahān. It also holds the grave of emperor Shāhjahān as well. The creation of the tomb was finished in 1643 A.D however, other work carried on further, over other levels of the construction, for a decade. Tāj Maḥal was finished as a whole in 1653 according to an assumption at an expenditure that was estimated at that time to be just about thirty-two million and if it is compared in 2020 then it would be something like seventy billion Pakistani rupees and round about 916 million US dollars. This construction plan engaged several artisans that were estimated to be 20,000. They all worked under the supervision of a committee of expert architects. This committee was led by Ustād Aḥmad Lahorī, a court architect to the emperor Shāhjahān. Ustād Aḥmad as a chief builder of Tāj Maḥal, designed the memorial (Taj Mahal 2020).

In 1983 the Tāj Maḥal became a UNESCO World Heritage site on the title of the jewel of Muslim art in India and one of the universally admired masterpieces of the world's heritage. Numerous consider Tāj Maḥal, the finest model of the Mughal style of structural design, which marks the affluent history of the Indo-Pak Subcontinent. Due to unique and distinctive structural features, this structure is a masterpiece and of the most distinctive work not only ruler Shāhjahān but of the whole Mughal era. This building defines the presence of a true sense of art and building among Mughals. Shāhjahān as an Emperor of the architecture of Mughal, marked a new standard by constructing such a wonder. The Tāj Maḥal is fascinating and enchants its visitors (see Figure 56). It is also estimated that roundabout seven to eight million tourists visit this place every year. In 2007, A.D. Tāj Maḥal had been acknowledged to be among the Seven Wonders of the World (Taj Mahal 2020).

In 1631 on the date of June 17, wife and chief consort of Emperor Shāhjahān, Mumtāz, died due to the delivery of an infant. She was the 14th offspring of the couple. Shāhjahān was grieving the death of his beloved wife and to honour, he ordered the construction of a grand mausoleum for her. Thus in 1632 A.D, construction was commenced after Shāhjahān granted a large sum of money for the building. As the tomb finished in 1648 A.D, but the other surrounding green gardens and extensive structures were built and completed half a decade later. It is also noteworthy that many works of the literature suggest it was immense love and the grief for the loss of love which lead to such a wonder. Moreover, documentation studied from the royal court of Shāhjahān also depicts that the true inspiration for Tāj Maḥal was the love and affection of the emperor for his deceased wife.



Figure 56: Front View of Tāj Maḥal India.

Source: “The Charm of Taj Mahal Goes on, but Its Birthplace Slowly Collapses.” Hindustan Times, February 26, 2015. <https://www.hindustantimes.com/travel/the-charm-of-taj-mahal-goes-on-but-its-birthplace-slowly-collapses/story-O2j7tnX7JEqFkWQfmJ75KM.html>.

The Tāj Maḥal includes a recommend background of Islamic as well as the Subcontinent’s former structural design. Precise encouragement was inspired since flourishing Timurid , and Mughal style which counts Gur-i Amīr¹³ and Humāyun’s Tomb that encouraged the innovation of featured Chāhārbāgh Gardens in Tāj Mahal as well along with the structural design of the site of Itimād ad Daula Tomb. Itimād ad Daula's Tomb is considered as the Baby Tāj and Shāhjahān's own Jāmia Masjid in Delhi. Even as previous Mughal constructions had been principally built by red-sandstone, Shāhjahān enhanced the application of white marble that was further incorporated by valuable gems. The structure’s underneath Shāhjahān’s investment reached a new sophistication level (DuTemple 2003).

The tomb was the pride and joy of a forty-two-acre compound, which included a Mosque, residential quarters or guest house, and official green lawns enclosed from different directions with walls. On the whole, the Tāj Maḥal compound mausoleum was granted with special attention. A bulky white marble composition had been positioned over a four-sided geometric-shaped platform along with a proportioned construction amid Īwān called arch-shaped doorway was capped with a huge dome. Similar to many Mughal tombs, the fundamentals were of Iranian derivation.

Support formation was a huge cube of several chambers in the company of chamfered corners that establish an uneven eight-sided structure which was equal in

¹³ the tomb of *Timur*, progenitor of the *Mughal* dynasty, in *Samarkand*

measurements from four directions resulting in a perfect square, one hundred and eight feet respectively. Each side of the Īwān was flanked by massive pishtāq comprising of a pair of similarly formed vaulted terraces confined over both sides. The design of confined pishtāqs was followed as it was on the chamfered corner spot; in this way, design became wholly proportioned from every direction. The tomb had four tall minarets, one at every end of the raised platform facing the chamfered corners. Chief hall shelters fake sarcophagi of Mumtāz Maḥal along with Shāhjahān but original graves are situated in the ground storey.

A marble dome was constructed, which became a stunning trait of the monument. Therefore, its dimensions were measured to be one hundred and fifteen feet in height. These calculations were nearly the same as the length measurement of the base. The Dome of the tomb was built over a cylindrical drum that was twenty-three feet tall almost. Due to the unique figure of this dome, it was termed as onion dome or guava dome. The apex of the dome was adorned with lotus designs, which followed throughout the altitude as well. Further, four minors vaulted chattrīs were also installed on corners which enhanced the shape of the dome. These minor domes were similar in design to the central main dome, which was not symmetrical. The columned bottoms of these chattrīs open from the roof, therefore, act as the light source inside of the tomb. Ornamental vines and twisted spirals start from sides to surfaces of bottoms. Lotus motifs were recurring on chattrīs along with *guldasta*. Gold finial capped the apex of dome and chattrīs, which was a mixture of Islamic and Hindu ornamental fundamentals. (Gascoigne 1971).

Surrounding minarets were moderately tall and executed of keen interest of builder in balanced architecture. Four minarets were situated on four corners and intended as functioning minarets which was a conventional component for Mosques exercised by the muezzin to summon worshippers with *azan* for namaz. Every mīnār was separated further into three sections that were equivalent; this separation was by a pair of terraces which chime the mīnār. The design of the typical dome was also introduced as an apical terrace of mīnār was capped with chattrīs. All are in the building was adorned by a similar ornamental feature of the calligraphic inscription in carving: "O Soul, thou art at rest. Return to the Lord at peace with Him and He at peace with you". This feature was created by calligrapher Abdul Haq. Shāhjahān bestowed the label Amānat Khān to Abdul Hāq as a prize for his splendid kindness and virtues. (Koch 2006).

Close to verses from the Quran on the bottom of the internal dome was writing in calligraphy Written by the insignificant being, Amānat Khān Shīrāzī. Most calligraphy was a collection comprising extravagant characters finished in jasper or black coloured marble incorporated in white marble boards. Among these boards, higher boards had been written with slightly superior characters to lessen skewing cause whenever seen from below. The calligraphic inscription was also found on the marble-made cenotaphs inside of the burial place, which was relatively more predominantly comprehensive and elegant (Gascoigne 1971).

Flora and vines motifs were exhibited in the sculpted dados bas-relief in white marble, coating the surfaces of the lower walls of the monument. The polishing of marble granted shining gleam to the surface of the whole structure; delicate details of carvings were also highlighted by such shine. Ornamentations included dado framework along with arcades beautify with *Pietra-dura* incorporations in the marble which were, extremely stylish, vegetative branches with geometrical floral patterns and designs including fruits as well (see Figure 57). Inlaid stones were multi-coloured marble stones ranging from yellow, jasper, and jade; they were further modified by intensive polishing to smooth and enhance the shine of walls (Koch 2006).



Figure 57: Ornamental work on white marble in the interior of Tāj Maḥal.

Source: “Pin by Erika Denisse Hdez. Mayo on Places: Mughal Architecture, Taj Mahal Interior, Taj Mahal.” Pinterest, February 14, 2018. <https://www.pinterest.com/pin/775393260819745808/>.

The inner compartment of the Tāj Maḥal reached far-off from conventional enhancing essentials. Engraved work is not *Pietra-dura*, infers its a lapidary of valuable and semi-expensive jewels. It was described further as the inner chamber is an octagon with the design allowing for entry from each face, although only the door

facing the garden to the south is used. Further, it was added the interior walls were high and are topped by a fake interior dome decorated with a sun motif. Eight pishṭāq arches describe the liberty space at earth stage and, as with the exterior. Hence, every inferior pishṭāq was capped with succeeding pishṭāq almost in the middle, upwards on the wall. The four middle superior arches form terraces or screening places, and each terrace's external windowpane has a convoluted panel engraved from marble (Koch 2006).

Muslim practice prohibits the detailed embellishment of graves. Therefore, Mumtāz and Shāhjahān were deposited under a comparatively simple vault below the central hall, oriented towards Kaba. Mumtāz Maḥal's cenotaph was positioned in the middle of the internal hall on a rectangle-shaped bottom made from marble with a dimension of 5'X8'. Together the bottom and casket were ornately inlaid with expensive and valuable gems. Inscriptions in a calligraphic form on the casket recognize and pay tribute to Mumtāz with words. Over the casket's lid, a relatively high rectangular tablet was built intended to hint a text tablet. Shāhjahān's cenotaph was established next to Mumtāz's on the west. It made the only noticeable non-symmetric element in the whole compound. Cenotaph of Shāhjahān was comparatively superior to Mumtāz's, (see Figure 58) but it reflected the similar fundamentals: a larger casket on a slightly higher bottom accurately adorned by lapidary along with calligraphic inscriptions which recognize the great ruler. Over the casket's cap which was a traditional statue of a small writing implement box (Taj Mahal 2020).



Figure 58: Cenotaph of Mumtāz Maḥal and Shāhjahān side to side with each other.
Source: "Mumtaz Mahal Tomb in the Taj Mahal." Treebo Blog. <https://www.treebo.com/blog/taj-mahal-facts/mumtaz-mahal-tomb-in-the-taj-mahal/>.

The compound was set approximately 980' large quadrangle-shaped Chāhārbāgh or Mughal Garden. This plot had relatively high passageways that split all four sections of the patch. In the middle of the tomb and entryway, in the mid of the garden, was an elevated water tank made with marble along with a shining pool to be found on south to north alignment that represents a depiction of the tomb. A high-water tank made of marble was known to be *Al Hawd-al-Kawthar* with an indication to the Tank of Abundance declared as a reward to Prophet Muḥammad (s.a.w) by Allah. (Taj Mahal 2020)

The majority of Mughal Chahārbāgh was rectangle-shaped, containing a mausoleum in the middle. Garden of Tāj Maḥal is abnormal due to a major constituent. The burial place was situated at the far corner of the garden due to the finding of Mahtab Bagh or also referred to as Moonlight Garden on the other side of the Yamuna river; an explanation of Archaeological Survey of India is that the River itself was integrated into the garden's plan and was intended to be seen as one of the rivers of heaven. Common features of outline and architecture with the Shālimār Gardens recommend that both grounds had been intended by a single builder 'Ali Mardān. The yearly financial statement of the garden describes its abundance of foliage and plantation of floral plants together with plentiful roses, daffodils, and many fruit trees. With the decline of the Mughal Empire, the Tāj Maḥal along with its Chāhārbāgh was also subsided. By the end of the 19th century A.D, the British Empire covered more than three-fifths of the Subcontinent and took the administration of Tāj Maḥal. The landscaping was altered for taste which is more narrowly similar to the official gardens of London (ASHER 1992).

On one end of the compound, a pair of impressive red-sandstone structures was made, which are like one another and are oriented towards the mausoleum. The rear side of these paired buildings corresponds to the western side to the eastern side walls, respectively. The building of Westside was a Mosque while other was like an answer and called *ajawāb*, which was supposed to create architectural equilibrium even though it had been utilized as a guesthouse. The difference in this pair included the short of a *mīhrāb* in *jawāb*. A *mihrab* is defined as an alcove in a wall of the Mosque that faces Qibla. Moreover, the floors of *Jawab* were of statistical in drawing while the floor of the Mosque building was laid with outlines of many prayer rugs in black marble. The Mosque's essential plan of a long chamber flanked by three domes was like other buildings by Shāhjahan, chiefly the Jama Masjid, Delhi. The Mughal Mosques of this age separated the sanctuary hall into three sections consisting of a

chief sanctuary and somewhat slighter sanctuaries on each side. In the Tāj Maḥal, each chamber falls onto a liberal dome. Other surrounding structures were finished years later. (Koch 2006).

Shalīmār Gardens Lahore

One of the most perfect and artistic construction during the period of Shāhjahān includes the Shalīmār Gardens. These Gardens are a complex of the Mughal era (see Figure 59). The locality of the Garden is in the city of Lahore, which is the capital of Punjab, the most populated province of Pakistan. These gardens were dated back to the time when the Mughal reign was at its peak both in architecture and art. Therefore, even today they are one of the most visited key tourist attractions due to their impressive design and artwork. The layout of the gardens was an inspiration from the Persian style of a garden called paradise garden. The main purpose was to represent an imaginative and innovative place of perfection on earth which would resemble a paradise, an imaginative perfect place where all being would live in peace and agreement with all features of the natural world. (Gardens of the Mughal Empire 2020)



Figure 59: Shalīmār Gardens, Lahore.

In 1641 A.D, the construction of the complex was officially started during the rule of Shāhjahān. These gardens were constructed by him. Therefore, they exhibit the feature mark of Shāhjahān within its architecture. Finally, in 1642 A.D, construction was completed. The gardens complex is situated in the close vicinity of Bāghbānpūra

and three miles away towards the northeast side of the walled city of Lahore, along GT road.

The word Shālīmār is a combination of two Turk language words where Shāla means delight and mār means a place worth living in. when Ranjit Singh was informed about the meaning of the name of gardens, he was displeased and named the Shāhla Bāgh. In the Persian language, the word Shāhla means a sweetheart with a dark grey eye and a shade of red, and Bāgh means garden. The court members were impressed and praised the Mahārājā for giving such an appealing name. Consequently, the gardens were called and written by that name after that in public communication. However, these gardens are still recognized as Shālīmār Gardens in the present era as well. It was believed that the word Shālīmār is a new version of the word Shālīmār. (Chaudhry 1998)

This Garden complex was constructed by the Mughal emperor as a place to please and receive the visitors of the Royal family. However, a large section of these gardens was open for the community as well. The style and design of these gardens were inspired by the former Shālīmār Gardens of Srinagar. They are different in the regard that Gardens in Srinagar depended upon the inclined geography while gardens in Lahore needed expert techniques to construct artificial terraces and waterfalls. They were planned over the style of Persian garden Chāhārbāgh. Many records have shown the influence of Shālīmār gardens of Srinagar over the Lahore gardens. For the water supply, a specific spot was selected. Khālilullah Khān, with the association of Mulla Alaul-Mulk Tunni, was the project manager who was an aristocrat from the Mughal court. a 100 miles extensive channel was constructed to deliver water from Kashmīr's foothills to the Gardens. (Clark 2004)

The architecture of Mughal gardens was influence by the Timurid style of gardens in Persia and Central Asia. It comprised of tall walls of bricks adorned with fretwork which creates the view of the paradise garden. The layout of these gardens was a rectangle-shaped plane that was oriented along the north to south axis. The dimensions were measured as 2158' in length and 846' wide, which wrap the region of about 39.5 acres. Every terrace is higher than the other one with a measure of 15'. The upmost terrace is recognized as Bāgh i Farāh Bakhsh, which means the source of delight (see Figure 60). The other two terraces are called Bāgh i Faiḍ Bakhsh, which means a source of kindness (see Figure 61). The uppermost and third terraces were built in the shape of a square with a second terrace different in rectangle shape.



Figure 60: Farah Bakhsh Terrace, Shalimār Gardens Lahore.



Figure 61: The Faid Bakhsh terraces, Shalimār gardens Lahore.

The major entrance to the gardens was on the lowest terrace of the garden, and it was used by courtiers or aristocrats and sometimes by the community as well. The central terrace was the garden of the ruler which was laid with highly detailed waterworks than any other Mughal Garden. The uppermost terrace was used only for the harem of the ruler. Two square terraces were separated by fountains into four equal squares of smaller size. Adjoining these fountains were Khayābān pathways made of brick which were intended to be high so that view of the Garden could be seen better and spectacular. In the mid of the terrace, Marble trails called Chadors

were built over which cascades would flow. A large Hauz was constructed as a water reservoir surrounded by seating pavilions. (Clark 2004)

Red Fort Delhi

The Red Fort considered being an important garrison in Delhi, India at present that served the purpose of the chief residence of the Mughal rulers. In 1637 A.D, Shāhjahān ordered the building fort at the time of transfer of the empire's center as Delhi instead of Agra. At first, its design was created by architect Ustād Aḥmad Lāhorī to be red and white in outlook. Tāj Maḥal was also designed by him. It was constructed between May of the year 1639 and April of 1648 A.D. The Red Fort has an area of 258 acres together with the enclosure of more than 6560' of protective ramparts with turrets and bastions that differ by stature with 58'-9" on the side of the river and 108' on the side of the city. The fort was built in octagonal geometric shape in the north to south alignment lengthy from east to west one (see Figure 62). The application of white marble with flower-patterned ornamentations and the double dome of the fort is an example of Mughal architecture.



Figure 62: Red Fort Gate Delhi.

Source: "India-0037 - Red Fort: Red Fort, Independence Day India, World Heritage Sites." Pinterest, January 26, 2015. <https://in.pinterest.com/pin/429953095651163900/>.

This fort exhibits the high intensity of adornment and Koh-i Nūr apparently as a component for designing. The architecture of this fortress was an amalgamation of Persian, Western, and Subcontinent art, consequently in a unique Shāhjahāni style affluent in the figure, appearance, and tint. Fort was a construction compound in the

Subcontinent that enclosed large historic records along with cultural and building art. The Lahori and Delhi Gates were utilized by the community while the Khīḍrabād Gate for the ruler himself. While Lahori Gate is the major opening that leads to an arched shopping spot recognized as the Chatta Chauk as it was capped with a dome. The most significant existing stature comprises fortifications, the major entrance, the area for the audience with regal quarters at the east side bank of the river (World Heritage Site - Red Fort, Delhi 2020).

Lahori Gate

The main entrance for Red Fort was termed due to course towards Lahore city. At some stage in Aurangzīb period, the attractiveness of the door was flawed by the accumulation of bastions that was elaborated by Shāhjahān as a veil drawn across the face of a beautiful woman.

Delhi Gate

The Southside doorway for community use was Delhi Gate. It is comparable in design and facade to that of Lahori Gate. Two actual size elephants made up of stone were fitted on each side of the opening with orientation in such a way that they are in front of each other.

Chatta Chauk

Nearby in the direction of the Lahori Gate is the Mīna bāzār which was called Chatta Chauk. Here, silk fabric, jeweller, and additional stuff for the royal family were sold for the duration of the Mughal reign. This bāzār was previously known as bāzār-i-Musaqqaf, a shopping bāzār with a ceiling. Lahori Gate, the access doorway of the fort opens inside a courtyard that opens here; it crosses the big street, which at first separated the military functions of the fort from the palaces. Delhi Gate is present at the south side end of the street.

Naubat Khāna

A domed shopping-covered passage, Chatta Chauk splits during the middle of the superficial square. The dimensions of the court were measured to be 540' in length to 360' in width. The eastern fence of the outer square locates the currently secluded Naubat Khāna (see Figure 63). It is a Persian language word which means The Waiting Hall and is referred to with another name Nakār Khāna meaning the

drum house. Melodies resonated on an everyday basis on programmed moments, and everybody was required to get down with the exception of royal members.

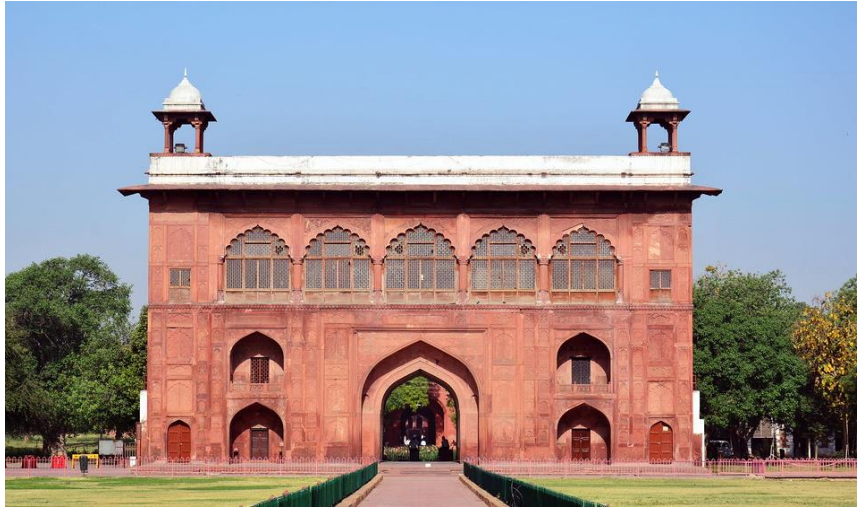


Figure 63: Naubat Khāna Red Fort, Delhi.

Source: Sommer, Manfred. "India - Delhi - Red Fort - Naubat Khana (Drum House)." Flickr. Yahoo!, September 24, 2014. <https://www.flickr.com/photos/asienman/15155523970>.

Mumtāz Maḥal

This structure was built especially for Mumtāz Maḥal and served as the personal residence of Mumtāz (see Figure 64).



Figure 64: Mumtāz Palace Red Fort, Delhi.

Source: Chaudhuri, Zinnia Ray. "A Walk through History: The Forgotten Women Who Helped Shape Delhi." <https://scroll.in/magazine/817669/a-walk-through-history-the-forgotten-women-who-helped-shape-delhi>.

Rang Maḥal

A private residence for the consorts and wives of the king was Rang Maḥal. The name Rang Maḥal was given due to bold-coloured paints and mosaic mirror work (see Figure 65). The white marble middle pool was fed by the Nihri-i-Bihisht.



Figure 65: Rang Mahal Red Fort, Delhi.

Source: Sommer, Manfred. "India - Delhi - Red Fort - Rang Mahal - 30." Flickr. Yahoo!, September 28, 2014. <https://www.flickr.com/photos/asienman/15351454066>.

Dīwān-i-Khāṣ

This structure was built for the executive dealings and requirements of the freshness and imperial folks. A northern gate towards Dīwān-i-‘Ām lets in the innermost patio called Jalaū Khāna also to Dīwān-i-Khāṣ. It was built with white marble that was inlaid with expensive stones (see Figure 66). The ceiling was silver-coloured. The Peacock Throne of Shāhjahān was installed in this place.



Figure 66: Dīwān-i-Khāṣ Red Fort, Delhi.

Source: "Diwan-i-Khas Historical Marker." Historical Marker, January 24, 2020. <https://www.hmdb.org/m.asp?m=144850>.

Ḥammām

The word Ḥammām is an Arabic word that means the bathing area. It was built in Red Fort and served the purpose of royal baths. They are comprised of three rooms with dome and white marble decorative floors (see Figure 67).



Figure 67: Hammām of Red Fort, Delhi.

Source: Don't just "click" pictures; Shoot Stories! "Hammam (Royal Baths), Red Fort, Delhi." Flickr. Yahoo!, April 15, 2014. <https://www.flickr.com/photos/nileshkorgaokar/13873027085>.

Baoli

In the fort, a Baoli, also called step well supposed to be present even before the construction of the Red Fort. The Baoli of this fort is distinctive in its manner and style with double sets of staircases that lead to the well as the name shows, step well (see Figure 68).



Figure 68: Baoli in Red Fort, Delhi.

Source: "Blog Tool, Publishing Platform, and CMS." WordPress.org. <https://wordpress.org/>.

Motī Masjid

On the west side of Hammām, a mosque named Motī Masjid, also referred to as the Pearl Mosque, is situated. Later another structure was added in 1659 A.D to be a personal Mosque for Aurangzīb. It was a petite structure with three domes that were

engraved in white marble, and three curved screens that lead to the courtyard, were installed (see Figure 69).



Figure 69: Motī Masjid Red Fort, Delhi.

Source: Wanderer, East Med. "Moti Masjid, Red Fort, Delhi, India." Flickr. Yahoo!, April 9, 2009. https://www.flickr.com/photos/east_med_wanderer/3427512536.

Hīra Maḥal

The Hīra Maḥal, referred to as Diamond Palace, is considered as a spectator area towards the south periphery in the fort. It was constructed by Bahadur Shah in the last part of the Hayāt Bakhsh Garden. Motī Mahal on the north end was an identical clone structure that shattered under British rule. The Shahī Burj advantaged as the chief learning area for the king, so the term was meant Emperor's Tower. At first, this was built with chattrīs as the crown.

Hayāt Bakhsh Bāgh

The Hayāt Bakhsh Bāgh is a Persian language word meaning the Life-Bestowing Garden. It is situated at the northeast division of the compound. It comprises a basin of water that dried out at present and channels for Nihri-Bihisht through which water flows. At every ending, a pavilion built with white marble was constructed which was named the Sāwan and Bhādon Pavilions. Within the heart of the basin, a red sandstone structure called Zafar Maḥal was built but not by Shāhjahān in fact by Bahādur Shāh Zafar. Relatively small gardens were also introduced but were ruined by British actions later. Ahead of gardens, a northside road leads to a vaulted overpass and the Salīmgarh Fort.

Princes Quarter

In the very northern direction concerning Hayāt Bakhsh Bāgh as well as Shahī Burj, a chamber for majestic princes was constructed. This was in use by an associate of the Mughal royal family. However, this place was mostly smashed via the British military following revolt. A palace was also transformed into a Tea House for the use of armed forces personnel.

Chapter V

Mirror Mosaic Work (Ā'īnakāri)

Historical Background

Mirror mosaic or Ā'īnakāri is a type of mosaic work which is an art used for decorating ceilings and walls, with a design composed of small mirrors of various sizes. (Goetz Lewis 2007) Basically, the word mosaic is derived from Italian word “Mosaico”, further derived from Latin word “Mosaicus” and Greek “Mouseios” which means it belongs to Muses¹⁴. The term mosaic refers to the creation of decoration in different patterns and images with small tesserae, cubes, glass, and ceramic in grout. Mirror mosaic is the developed type of a mosaic art which were started from the glazed tiles mosaic. It can be a medium, expression of creativity, fine art, public art or amalgamated in architecture, both interior and exterior.

The earliest known evidence of mosaic work was found in Sialk, Central Iran. Archaeologists discovered a settlement site with the traces of mosaic dating back to 5000 B.C (A. U. Pope 1965). The Connection between India and Persia was linked by silk-route, used for trade in ancient times. It became the source of transmission of the art to India as well Central Asia (Grabar 1999). Persia was ruled by different rulers, Parthians, Sassanians, Achmenian, and Greek. They practiced different artistic works like mosaic, mural, and mural paintings on the ceiling and walls. Greeks practiced the technique of pebble to create art in the form of mosaic during the 3rd Millennium B.C. These mosaics were decorated with geometric patterns and scenes of animals and humans. During 200 B.C, tesserae were used in a variety of colours to create mosaic with extra detail.

At the emergence of Islam, there was lack of art in Arabs; they adopted the mosaic art from Syria, Egypt, Iran, and Mesopotamia after the invasion¹⁵ and copied the finest art of these countries. Historical records mention that the caliphs of the Umayyad Dynasty 661-749 A.D acquired the material and craftsmen to build different new cities as well as palaces and mosques. Some Western scholars link Islamic art to Byzantine and Greek Origin (Saoud 2004). Byzantine and Syrian artists practiced mosaic art at the Mosque in Damascus, where an Iranian played a role of chief

¹⁴ The Muses are minor goddesses of the Greek pantheon. They are the personifications of literary arts, music, visual arts, and science.

¹⁵ It was the expedition to these Kingdoms in 7th Century A.D.

architect. These practices continued to Abbasids 749-945 A.D. Earliest example of mirror mosaic in Islamic monument is the Dome of the Rock, Jerusalem built during 691-692 A.D (Dimand 1944). The historic Dome of the Rock is a clear example of adoption of the cultural icons to reveal new ideas. The monument's exterior and interior is decorated with mosaics by the craftsmen of Byzantine art (see Figure 70). Inside the Dome of the Rock, artists practiced, the concept of mosaic work in the form of trees, floral designs which are depicting a scene of heaven (Hoag 1975)



Figure 70: Mosaic Art in the Dome of the Rock, Jerusalem.

Source: Metmuseum.org. <https://www.metmuseum.org/exhibitions/listings/2012/byzantium-and-islam/blog/where-in-the-world/posts/dome-of-the-rock>.

In the early period in 13th Century A.D, there are no traces of glass or mirror-work in India. Mughal used glazed tiles to create mosaic in the Indian subcontinent. It was originated in Iran (Koch 1966). Main Center for the glazed tile ornamentation were Punjab and Sindh with the reflection of Iranian influence, came through the central Asia as tomb of Khajeh Atabak in Kerman is the earliest example of glazed tile mosaic work (Hamzavi 2019). The Earliest example of glazed tiles work can be seen in the tomb of Sheikh Bāhu-al Dīn Zakāriyya, Multan. Tomb of Shah Rukn-i ʿAlam, Multan decorated with glazed tiles is fine example, as compared to Iran and Central Asia monuments. Some other historic monuments at Uch, Lāl Mohra, and Kot Mīthan, located in Punjab and Sindh Province, are also fine example of this artwork. These monuments also belong to this period, are decorated with glazed tiles of Multani style. In the Tomb of Mūsa Āhangar, Lahore 1560 A.D where Multānī style tiles are used, was built during the Akbar period. Blue and white glazed tiles are used in the dome of tomb.



Figure 71: Glazed Tiles Mosaic from the Tomb of Ustad Shagird, Jalandhar India.

Source: “A Detail of a Tile-Mosaic Panel from the Tomb of Shagird, Punjab ...”

https://www.researchgate.net/figure/A-detail-of-a-tile-mosaic-panel-from-the-Tomb-of-Shagird-Punjab-Orange-coloured-tiles_fig3_259546794.

The glazed tile decoration started much earlier with a long history, went through various developmental stages from the ancient world to reach at the present use of glass mosaic (S. Chandra 2003). It was done with the combination of brick for both interior and exterior. The use and development of these tiles in the subcontinent started during the Mughal Period 1526-1857 A.D (Chaudhary 2000). Systematically these tiles were employed during Mughal emperor Akbar 1556-1605 A.D at Agra Fort.

Jahāngīr 1605-1627 A.D continued the same glazed tiles mosaic art for ornamentation and mural painting (see Figure 72). After Jahāngīr, the developments in architectural elements were done during the period of Emperor Shāhjahān 1628-1658 A.D. Palaces built by Shāhjahān are unique because he used mirror and glazed tiles to create beautiful mosaics in monuments.

Mirror Mosaic-Work in Shāhjahān Period

The Mughal played a significant role in the architectural history of India by building fascinating imperial structures. They introduced architectural ornamental decorations in the form of glazed tiles (Kāshīkāri), stone, mirror, glass mosaics, inlay work, *Pietra-dura* (Parchīnkārī), mural and fresco paintings for the beautification of

their monuments (Brown 1942). These monuments spread over the subcontinent, depicting a Persian influence. Mughal emperor Shāhjahān erected several monuments throughout the subcontinent and achieved excellence in ornamental arts. Fine quality mirror mosaic and convex mirror work could be seen in Shīsh Maḥal of



Figure 72: Glazed tile Mosaic from Lahore Fort.

Source: A tile mosaic in the Lahore Fort, Pakistan. http://www.kamit.jp/24_pakistan/xlah_2eng.htm.

Lahore Fort, Red Fort Delhi, and Agra Fort. To the southern side of the Shīsh Maḥal, there is an Aīwan, where the craftsman and painters practiced their skills and made wonderful designs. In this double-tiered structure, the area of $5m^2$ is decorated with mirror work (Nadeem 2011). A famous structure in the red fort is Rang Maḥal (Imtīāz Maḥal). This Maḥal is beautifully painted in fresco and ornamented with mosaic work, some of the portion of Rang Maḥal is also known as Shīsh Maḥal, due to mirror mosaic work to the interior (see Figure 73).

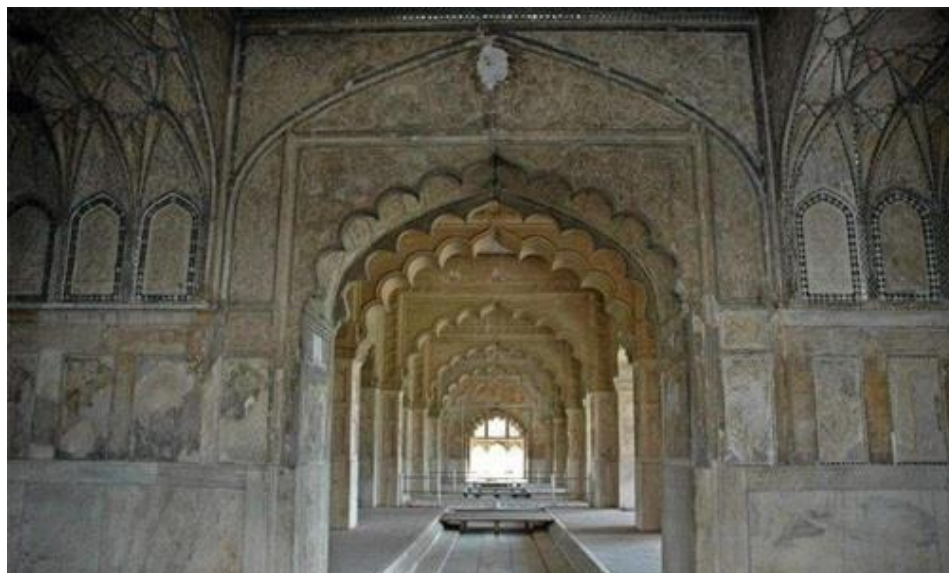


Figure 73: Mirror Work at Rang Mahal (Imitīāz Mahal) at Red Fort Delhi.

Source: “Delhi.” ESPNcrinfo. ESPNcrinfo. <https://www.espnrcinfo.com/gallery/delhi-485133>.

In Agra Fort, Shīsh Maḥal 1631-1640 A.D is the most beautiful structure on the western side of Mūthamman Būrj. It is connected through two large chambers, central arched opening, and two passages to the side. The Maḥal had an imperial female bath, and marble is used on the floor. The Maḥal is decorated with mirror

mosaic throughout the walls and ceiling. (Havell 1904). Illumination creates a sparkling effect through the palace. The walls of the Shīsh Maḥal are thick, which keeps the interior look pleasant. Its arches, walls, and ceiling are decorated with floral patterns. According to Hamīd Lahorī, a historian of Emperor Shāhjahān, these beautiful mirrors were imported from the Haleb, Aleppo Syria. The palace is also known as Shīshā-i Ḥalebī; the name is nominated with Syria.

Mirror-Work at Shīsh Maḥal Lahore Fort

Shīsh Maḥal 1631-1632 A.D was built by Shāhjahān as his personal residence within the Shāh Būrj of Lahore Fort. It is also known as a Choti Khawābgah or the small sleeping chamber now a day. Its name is derived from the mirror known as Aleppo glass which are used in the walls and the ceiling; it is bright and able to catch the tiny ray of light. (C. B. Asher 1991). The construction of this monument is the earliest addition to the Lahore palaces. It has an embellished chamber, along with central façade decorated with five cusped arches. It has a support of coupled columns of marble. Bases and spandrels of the columns were inlaid with semi-precious stones (Hedrik and Smith 2014).

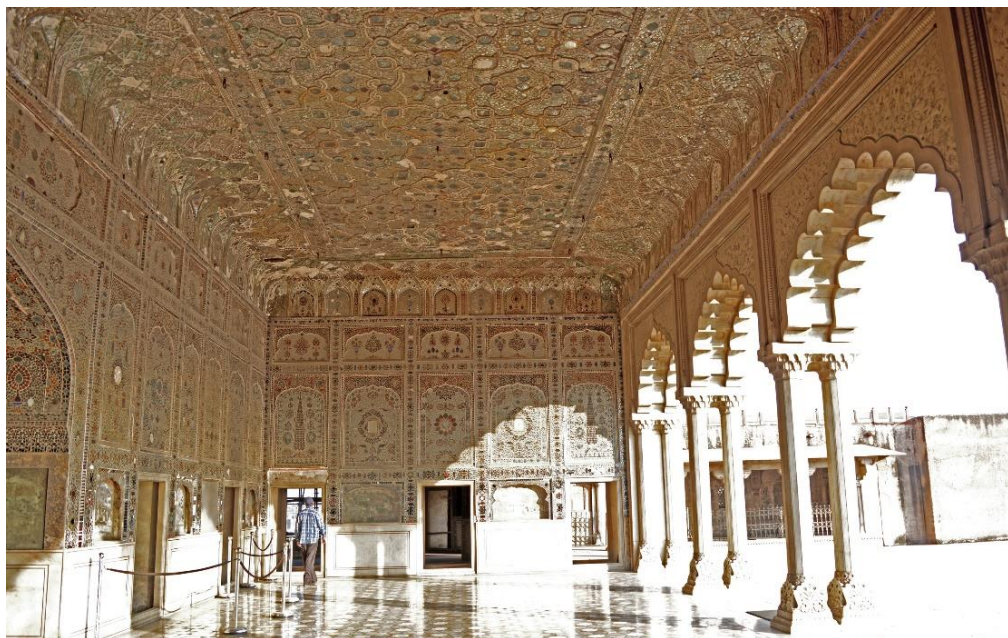


Figure 74: Mirror Mosaic at Shīsh Maḥal, Lahore Fort.

The room facing toward Dīwān-i Khās was the waiting area for the royal guests. The entire surface of the rooms was once ornated with stucco floral motifs and arabesque designs on the walls, soffits ceiling, and the dados carrying a stylistic similarity with palaces of Agra and Delhi Forts. Above these dado level, irregular and

small concave mirrors as well as large square and rectangular mirrors are used. Shahjahan's mirror mosaic work is covered with white stucco, divided into horizontal and vertical panels with different floral motifs in the central gaps. Soffits, ceilings, and cornices are embedded with small convex mirrors. These mirrors are mentioned as Shīsha-i Ḥalebī in the court chronicles because of whiteness glimmers when a tiny ray of light passes through it (N. S. Khan 2018). Each panel has decorative motifs done in the stucco relief and filled with mirror mosaic in some areas. The vertical panel usually have central vase in a low relief ornated with flowers. This is framed with an arch decorated with tiny pieces of mirrors filling the spandrels. Interlaced patterns filed with one large mirror or with a floral pattern embedded with tiny mirror and stucco relief. The cornices and the ceiling of the palace is decorated with interlacing pattern with a combination of stucco relief and mirror mosaic with cluster of small mirrors at the apex of lozenge shape of Qalibkāri¹⁶. The use of mirror mosaic in all instances is limited and overall impression from a distance seems a floral design are arabesques in marble relief with gems. It reflects the fascination of the emperor's white marble and their passion for diamonds and pearls (Shahjahan Nama). The design vocabulary of emperor Shāhjahān's Shīsh Maḥal was mainly floral designs, individual flowering plants, vases filled with flowers, and stylized arabesque designs (Koch 1990).

The mirror work on the ceiling and the walls have traces of repair in later period, probably 19th Century A.D (M. N. Khan 1971). The hall of the Shīsh Maḥal is rectangular in plan and surrounded by rooms on three sides. Numerous colours of convex mirrors are providing a majestic look to the Palace (see Figure 74). Two types of Arches are enclosed in rectangular frames on the wall of Shīsh Maḥal are pointed and cusped arches. Besides arches, square and rectangular frames are also done on the wall surface to enclose the floral and geometric mosaic designs (see Figure 75). Black and red colour mirror is used for cypress trees grouted with guch; the filling of gape looks like branches of the tree (see Figure 78). The cypress tree enclosed in cusped arches as well as elongated pointed arches. There are floating red mirror leaves around the cypress tree, rest of the spaces are filled with white reflecting convex mirrors.

¹⁶ It is Stalactite molding.



Figure 75: Mirror Mosaic at Shish Maḥal, Lahore Fort.

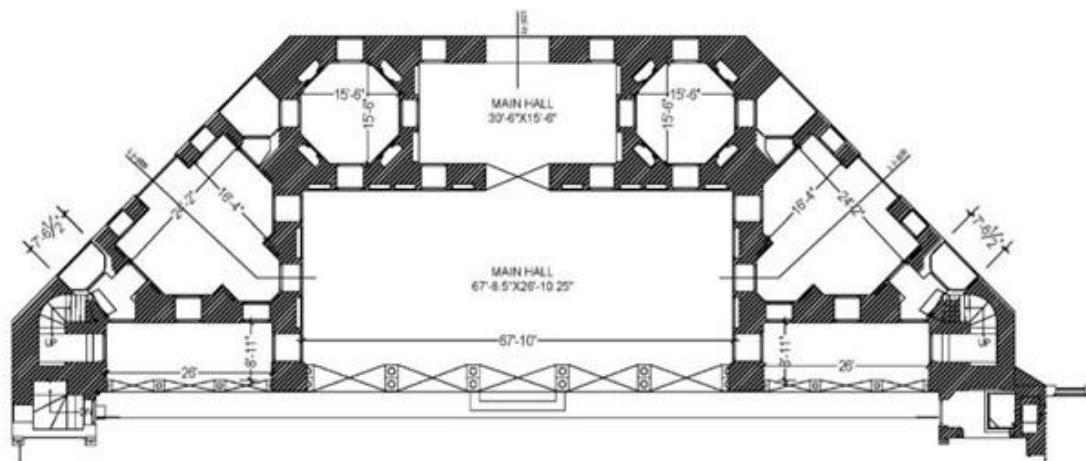


Figure 76: Plan of Shish Maḥal Lahore Fort by Archeology department.

The geometrical and calligraphy designs deployed in Shish Maḥal is in symmetry¹⁷. These designs comprised of octagons, triangles, stars, rectangles, are intersecting each other. The designs are prominent, as the lines are filled with grout (Gach). Mirror is used as additional material to provide patterns in a floral or geometric design. There are round, oval, rectangular, and leaf like mirrors deployed to cover the empty spaces. These floral designs have resemblance to sunflowers, rosettes, and lotus. Rectangular Hall has pointed arches on both sides, which seems like a mīḥrāb. Niches are decorated with paintings and cusped shape arches (see Figure 77).

¹⁷ Islamic art encompasses visual arts produced from the seventh century onwards by culturally Islamic populations. It includes a range of artistic fields including architecture, calligraphy, painting, glass, ceramics and textiles, among others.

Most the architectural historian believes that Mughal's mirror mosaic work is made of glass from Aleppo, and it was imported from that city. The earliest usage of this name appears in 1904 by Maulvī Nūr Bakhsh, who translated Lahori's account of Shāh Burj and called it Aleppo Glass (Bakhsh 1902). Syria was famous since ancient times for its glass mosaic and architecture, imagining being similar to the mirror mosaic of India.

According to William Malcolm Hailey, the decoration of the Shīsh Maḥal are from two different periods. The ceiling of the structure is original edifice, while inferior wall ornamentations and wall painting are from Sikh Period (Hailey 1927).



Figure 77: Cusp Shaped arch Ornamented with geometric and floral designs at Shīsh Maḥal Lahore Fort



Figure 78: Cypress Tree, geometric and imaginary designs at Shīsh Maḥal Lahore For.

Types of Mirror Mosaic

The mirror used by the Mughal artisans was made during 1556-1707 A.D and utilized for different purposes like decorations, vessels, etc. Glass of 16th to 17th century A.D shows indebtedness to the Persian influence. Mughal also imported Aleppo glass for the beautification of the palace's interior used in Shīsh Maḥal, Agra Fort, India. According to the studies, three types of glass used by Mughal Emperor Shāhjahān are as below;

1. Convex Mirror
2. Flat Mirror
3. Aleppo¹⁸ Glass

Convex Mirror

A convex mirror is spherical with a reflecting surface, bulging side of the mirror faces the light source directly. A convex mirror has a wide-angle view as compared to the normal flat mirror. It is created by applying a huge amount of heat to mirror; as it warms, it bends into an arch shape to form a convex mirror. Its curve depends on the heat, greater heat results a larger bend. During the Mughal Period, this type of mirror is known as *Pachī ka Shīsha*¹⁹ used in architectural decorations especially in the palaces built by the Shāhjahān and Sikhs around the subcontinent. Small tesserae²⁰ of the convex mirror in different colours are grouted together to make a complete floral or a geometric shape. In Mughal monuments it is adopted in Mumtāz Maḥal, Delhi Fort, Shīsh Maḥal, Agra Fort and Shīsh Maḥal, Lahore Fort.



Figure 79: Convex Mirror Mosaic from Lahore Fort.

¹⁸ Aleppo glass famous for its technique which was invented by Syrian craftsmen during the 1st Century. BC and it has been a tradition in Aleppo being passed down through many skilled generations.

¹⁹ *Pachī* is Urdu word used for basket and *Shīshā* is used for mirror, *Pachī ka Shīshā* is a type of mirror used during the period of Mughal Emperors.

²⁰ A small block of stone, tile, glass, or other material used in the construction of a mosaic.

Flat Mirror and Glass

Flat mirror or Shīshā reflects the Persian influence in art and design. Persian craftsmen came to the Indian subcontinent and contributed to manufacturing of mirrors by practicing new design and delicacy. Most of the specimen of Mughal period mirror examined that these were made by the blowing process. This method creates the mirror or glass with large number of bubbles. (Chaduri 1981) It exists in different types of colours and nature comprising translucent, transparent, and reflecting. Different metals and natural pigments are used to give different colours to the mirror. There are two main components used in manufacturing remained same throughout the time frame. These are mostly lime, soda, and silica with a combination of colouring agents. Traces of potash and oxides of lead are also found in some specimens. Mughal used these mirrors and glass to decorate the interior of the structure and goods of daily use.



Figure 80: The Shīsh Mahal in Deogarh Palace has windows with flat mirror.
Source: “Blog Tool, Publishing Platform, and CMS.” WordPress.org. <https://wordpress.org/>.

Aleppo Glass

Aleppo glass (Shīsha-i Halebī) was imported from Syria during the reign of Mughal Emperor Shāhjahān (Bloom and Blair 2009). It is used for different purposes as well as the ornamentation of Shīsh Mahal Agra (see Figure 81). Aleppo glass was invented by the Syrian craftsman in Syria. It was manufactured by blowing pipe technique. According to the technique, extreme heat provided to the glass and shaped with a tube by blowing air. Syrian craftsmen used gold dust metals to add a colour.

The technique has remained the same to the present day. During the early stage, they used sand material having a higher calcium ratio and mineral natron²¹ (Whitehouse 2002) . The glass was fine in quality, and Mughal utilized it in different aspects. It is used in Shīsh Maḥal, Agra fort to ornate the ceiling and wall.

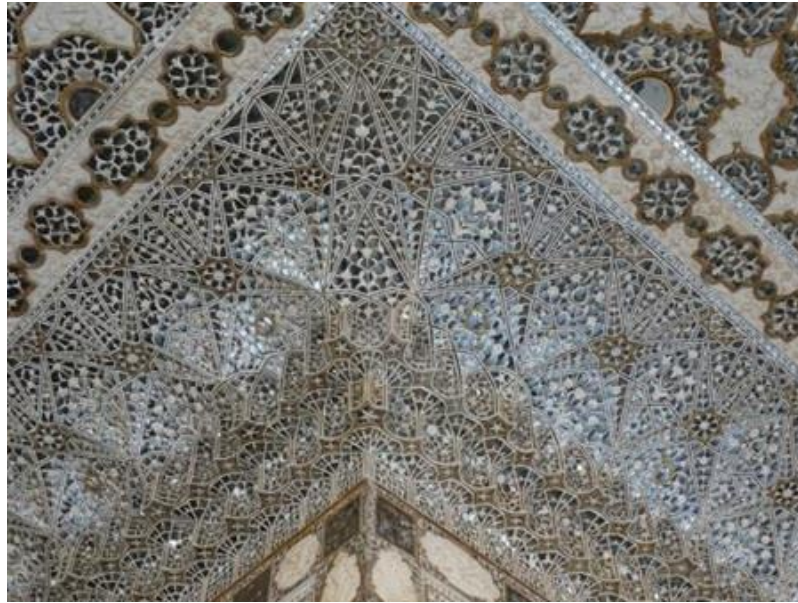


Figure 81: Mirror-Work in Shīsh Maḥal Agra Fort India.

Source: “Sheesh Mahal (AGRA) - All You Need to Know before You Go.” Tripadvisor.
https://www.tripadvisor.in/Attraction_Review-g297683-d4421871-Reviews-Sheesh_Mahal-Agra_Agra_District_Uttar_Pradesh.html.

Traditional Techniques of Mirror Work

As all the techniques of mosaic work are mostly inherited from the ancestors, that means it has a lot of similarities from ancient times to modern times. During the Mughal era, mosaic work was done with the help of perforated drawings. These drawings were specially made for this work with a different geometric element. A cloth was used with a pigment to print a decorated element on the surface. Later on, it was easy to fix mirror on the printed element. The layers of plaster were applied on the surface of brick wall. Mostly plaster was made with powdered marble and soapstone, sometimes with egg whites, curdled milk and ghee was also used. Stucco plaster applied in three coats, base coat, the second coat was to smoothen the surface and third was a final coat for mosaic work. All the plaster has a thickness of 1” to 1.5” inches. The design was drawn on the surface of the fine layer plaster and then carved with the help of special tools. According to the design of the drawing, all the glass pieces in different sizes were used to fill the space. Stucco finish was done by rubbing

²¹ Natron is substance that exist naturally as a mixture of sodium carbonate decahydrate and sodium bicarbonate. It has small amount of Sodium chloride and sodium sulfate. Throughout history is has had many practical applications to till-day.

it with abrasive and then moist chalk, and oil was used as a polishing agent. Highly refined Gypsum mortar was used as the cementing agent. It was used separately with each piece of glass separately. Outline of the floral design then overlapped with stucco forming leaves and flowers over the surface of glass piece and acting as grout at the same time. Stucco, Gypsum, and lime were only source to grout the gaps as well as used as glue (Hussain 2011). Traditional tools were adopted to complete mosaic work. It was helpful in geometric drawings, cutting, striking, grouting, and pasting. Wooden tools are also used fore for sensitive task to minimize damages.

Modern Techniques of Mirror Work

The art of making mosaic is a broad field, and it is seen as fine art or craft and architectural ornamentation. Making mosaic art is fascinating on many levels. Finding a suitable material with a wide range of colours and sizes is an absorbing job. There are two basic techniques used for any type of mosaic work, including mirror mosaic. These techniques are.

- Direct Method
- Indirect Method

Direct Method

The direct method of mosaic involves that the pieces of mirror, small tiles, are applied directly to the surface or base (wood, concrete, stone, ceramic) to grout a complete mosaic of desired design. This process includes that small pieces of glass/tiles in different colours and favourable sizes, are fixed together with tiles adhesive one by one. The advantage of the direct method is that a craftsman can see his work throughout the whole process. Alternatively, the whole design can be done on the moveable surface of wood or mirror, which means the completed work is easily transportable; it can be transported and applied to the surface. Tile adhesive are used to fix the mosaic work on the surface. One of the disadvantages of the direct method is that the final surface of the mosaic is not completely flat. This method is not suitable for floors surface where a flat surface is to be placed. It is possible to get a flat mosaic surface if the material which is being used have the same thickness.

Furthermore, this method can be inconvenient for huge projects, such as floor and wall mosaics, because all the work must be done on the site rather than workshop. Mosaic created by the direct method cannot be used outdoor because moisture and temperature can damage it.

A further addition to the direct method is double direct method, a modern technique of creating mosaic. In this method, a mesh is used as a temporary base, all the pieces are attached with mesh and then applied to the original surface. It is similar to the Direct Method and not suitable for flat surfaces. It can be applied on small projects (King 2003).



Figure 82: Mosaic restoration at Lahore Fort.

Source: Evagoetting. "Lahore Fort Picture Wall Prototype Project (Pakistan)." culturalheritage.news, August 7, 2019. <https://www.culthernews.de/laure-fort-picture-wall-prototype-project-pakistan/>.

Indirect Method

Indirect method is also known as a reverse method, and it is more complicated and difficult to make a mosaic for a flat surface; it requires artistic and technical skills. In this method, the pieces of mirror and tiles are fixed upside down, with a water-soluble glue on temporary surface. The whole process can be done in the workshop by different people before applying to the original surface. After the completion, there are two more steps to follow. One is to cast the whole mosaic using a frame around and pouring concrete inside, wrapping it in plastic to slow the setting time. After setting it completely, paper is removed, and the final mosaic work revealed. In second process, the back of mosaic is grouted to place like a bathroom tile. This method is best for large mosaics by dividing the design into equal size of pieces. All the pieces are created separately and rejoined after completion to make a complete mosaic.

The indirect method is effective even if your design has repetitions, as there is no need to see the tesserae face up. It is much effective to get a completely flat surface mosaic. The main issue of the method is risk of mistakes, as you cannot see what you are doing. But these mistakes can be minimized by using the same colours on both sides of tesserae.

A double indirect method is added to this technique as a modern method for mosaic. The method is most difficult as the way it is practiced. In this method, the pieces of tiles or mirrors are placed facing up on a temporary base with an adhesive. After the completion of this step, another layer of a similar medium is placed on the other side. Then the backing of the mosaic is removed for the final step and fixed with the help of a mortar. This method has less chance of mistakes; it can be a best method if you want to see your work side by side. It needs a greater care and skilled artists to deal with it (*Ibid*).

Traditional Tools



Figure 83: Indirect Mosaic Work.

Source: “The Reverse Method of Making Mosaics.” The reverse or indirect mosaic technique of mosaic making. <http://www.thejoyofshards.co.uk/projects/mermaid/reverse.shtml>.

Scissor:

It is also known as mosaic scissor and it was designed specially to cut tesserae into desired shape and size.



Figure 84: Traditional Scissor.

Marking Tool:

Traditionally, pencil and a piece of charcoal were used as a marking tool. These were the easily available marking tools of that time.



Figure 85: A Charcoal/Pencil.

Compass Divider:

It is an ancient instrument which was adopted for different reasons. It was used to draw a circle, to measure a distance, or mark a division.



Figure 86: A Compose Divider.

Small Brush:

During the Mughal period, craftsman used small brushes for cleaning and filling. Usually, those brushes were made from the hairs of different animals like squirrel or a camel.



Figure 87: A Small Paint Brush.

Wooden Float:

It is a traditional tool made up of wood and also used in modern times. The main function of the tools is to spread the grout on the surface of mosaic work.



Figure 88: A Wooden Float.

Small Tools:

Traditionally there were small tools similar to the dental tools used by the Mughal craftsman to clean the grout and glue residue between the gaps of mosaic. These tools are still in practice to create mosaic art.



Figure 89: A Set of Dental Tools used for Mosaic Work.

Along with these traditional tools, some modern tools are;

- **Cutter:** There is a wide variety of cutters used according to the material of tesserae. It can be a mirror cutter for mirror mosaic work.
- **Putty knife:** A medium-size tool with a wooden handle is efficient to paste the grout on the surface or to remove it cleanly.

- **Safety glasses:** These are protective glasses made up of plastic to avoid the contact of dust and small particles to the eyes. Avoiding these glasses can cause damage to the eyes.
- **Nippers:** It is a common tool used in different type of work, including mosaic work; it helps to break the glass or tiles into small pieces. It is used to get a desirable size and shape of glass or tile piece.
- **Hammer:** A rubber hammer with a wooden handle is used in glass or tile mosaic work. It is helpful in the adjustment of tesserae levels without damaging the surface.
- **Rubber Spatula:** It is a rubber-made tool with a plastic or a wooden handle. It helps to spread the grout gently on the surface of glass or tile mosaic work.
- **Clean Rags:** It is a piece of cloth made specially for mosaic work. It is very effective in cleaning the surface of the mosaic art with scratching. It is similar to the piece of a towel.



Figure 90: A Set of Modern Mosaic Tools.

Material

- **Tesserae:** These are the small pieces of coloured marble, mirror, pottery, and small tiles. These pieces are specially prepared for mosaic art.
- **Adhesive:** It helps the tesserae to be attached with the base; it depends on the method of mosaic making. In modern time there is a large variety of adhesive materials used for different purposes.

- **Grout:** This is a mixture like cement; it helps to fill the gap between the mosaic tesserae. It is also an alternative of glue. It comes in a large variety to be used on inside, outside, smaller gaps, and in larger gaps.

Analysis

Mosaic art is being practiced from the ancient world to modern times for the decoration of architecture. It is traditionally used for the ceiling, walls, cornices, dados, and floor decorations. It became popular during the reign of Mughal Emperor ShāhJahān in the sub-continent. He introduced the glass mosaic decorations with traditional and exotic stuff imported from Syria and applied in Lahore, Agra, and Delhi fort in India and some part of Pakistan nowadays. Mughal artisans from different reigns, especially from Persia, participated in the decoration of that time. They were experts in variety of architectural elements, as can be seen in Shish Mahal. They used variety of traditional tools in different sizes, from carving the stucco layers to the creation of mirror mosaic. These traditional tools are still in use even in modern time. These techniques of *Ā'īnakāri* remained the same from the seventeenth to the mid-nineteenth century.

There was no concept of powered tools for cutting or polishing glass pieces—only handheld tools were adopted to put detail in the architectural decorations. During the Mughal period, adhesive material was gypsum or Gach, and lime used as a mortar or a grout to fix small pieces together. Small pieces of mirror were fixed on the surface of plaster which was applied in three layers. This plaster was made of egg white, curdle, marble powder, soapstone.

In modern mosaic creation, the main focus is to build it on a unique and peerless qualities of the medium with the help of many modern tools; most of them are powered e.g. cutter and polisher, etc. Though modern time has different techniques to create mosaic art but there are some similar features which can be identified throughout the time frame. Material including different kinds of stones, mirror, and glazed tiles are still same. Now a day various adhesive glues, grouts are available in the market to use with a minimum setting and hardening time. There are two different types of adhesive material; one is ready mixed paste, and second is powdered adhesive. Both are used according to the nature of work. A large variety of glass in different colors produced on industrial level like float glass, shatterproof glass, laminated glass, extra clean glass, chromatic glass, tinted glass, toughened

glass, glass block, glass wool and insulated glazed glass, etc. Overall, in modern time creation of mosaic work is not as difficult as every element of the mirror mosaic is available, ready to use. But some tools and techniques are similar to the traditional practices. These can be adopted for the conservation of these monuments with accuracy.

Chapter VI

Stone Latticework (Jalī Sāzī)

Historical Background

Stone lattice is commonly known as Jāla²² or Jalī in native language. Stone lattice is a framework designed in crisscross patterns to form a Jalī (Ching 1995). In ancient Architecture, it is known by its design name like floral, chequered grid, squares with triangles patterns etc. In ancient times stone was the only material which were easily available and used by craftsman to decorate it with lattice design. But today we have different materials for crafting easily, using wood, plywood, plaster of Paris, plastic, mirror (Reidle 1989). There is a big difference in techniques used by ancient craftsmen and at present. In the past, handheld tools, chisel, and hammers were used for cutting, whereas, in modern time along with these handheld tools, machine work is also used for different purposes, to save time.

Latticework in Gandhara

The earliest example of stone lattice can be traced in Gandhāra (1500-1200 BC), ancient India, Pakistan, and Afghanistan (Zwalf 1996). According to the historical records, it was ruled by different rulers. Gandhāra went through developmental stages of art and architecture across the region. Its art is a religious devoting to Buddhism (see Figure 91). Approximately eighty thousand stupas built during the Ashoka period, passionating the Buddhist faith. These stupas have many relief panels describing the life stories of Buddha, decorated with different geometric and floral designs engraved in stones (Naeem and Ali 2008).

²² Jāla is Hindi word used for perforated work.



Figure 91: General View of Sanchi Stupa, India.

Source: “World Heritage Sites in India – the Speakers of Past - Travelsite India Blog: Sanchi Stupa, Great Stupa at Sanchi, the Great Stupa.” <https://www.pinterest.com/pin/516365913525488125/>.

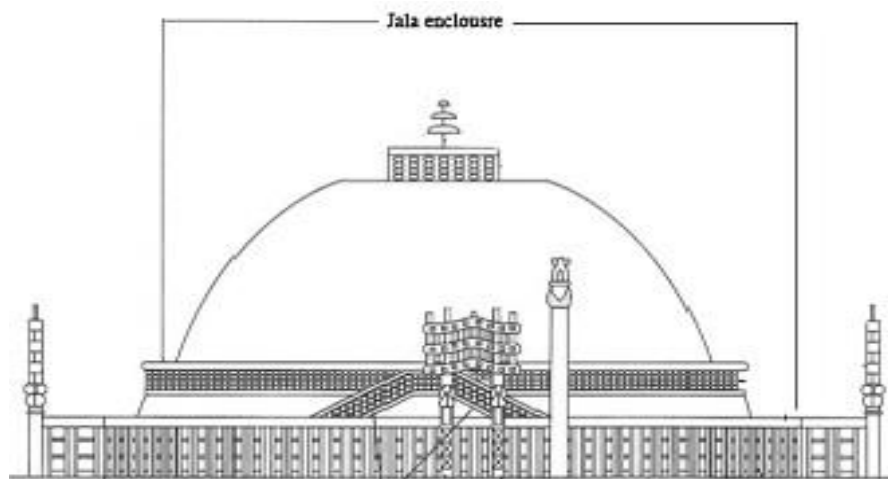


Figure 92: Diagram of Sanchi Stupa, Showing Railing Design.

Source: “/.” IIMBG. <http://iimbg.ac.in/our-logo/3-5/>.

Stone lattice in Gandharan art which were used to ornament their stone relief panels as well as used for their religious monuments. Stone lattice (Jālī) is the most common architectural element used by Gandharan architects. Typically, stone lattice designs are composed of upright octagonal plan having 45cm in diameter along with space of 60cm to 90cm from each other, connected with three horizontal bars known as Suchi²³ or needle 60cm deep being threaded through the hole of the upright (Faccena 2007). A top horizontal bar is provided with coping to drain out rainwater. This depiction of railing on the relief panels are used for different purposes. It was

²³ Suchi is a Sanskrit word used for horizontal crossbars.

used in panels in front of depicted balconies, gateways, stupas, and enclosures around the frieze.

Apart from the panels, in this railing design, stone lattice were also used for the Stupa itself. There are hundreds of stupas enclosed in railing, e.g., Stupa of Sanchi 3rd Century BC India, was constructed with a dome, drum, and base. The Dome and the base of the stupa is enclosed by perforated stone railing. The enclosure surrounding a circulatory path around the dome (Stella 1983). A railing was used to separate two different worlds, sacred and profane. (Eliade 1957).

Italian Archaeological mission to swat recorded many artifacts with the evidence of stone lattice; they placed all of them into geometrical decorative motifs (Luca M. Oliveri 2012). These panels were in rectangular shape carved in different designs. One of the panel is decorated with a row of squares have intersecting lines creating tiny triangles. Each triangle further contains small and sometimes large triangles inside. In the category of Reticolo²⁴, it is decorated with the chequered grid (see Figure 93) having alternating relief square, grid with alternating relief triangles, and lattice with oblique relief fillets²⁵ (Ingolt 1957).



Figure 93: A Relief Panel Decorated with the Chequered Design on the Top.
Source: "Galerie Golconda." <https://galeriegolconda.com/wp-content/uploads/2017/01/certif.1665.English.pdf>.

²⁴ Reticolo is an Italian term used for latticework.

²⁵ Fillets is a narrow flat band which separate two mouldings.

Latticework in Jain Temples

Through the timeline, Jainism contributed in India's architecture dating back to the 5th century A.D, made a huge development from caves to temples (Kiran 2018). These temples can be seen in different parts of India, having a majestic look. The crafts used by Jain craftsmen are mostly adopted from Buddhism and Hinduism. There is evidence that Jains copied some architectural elements (Stone lattice) from Buddhists in their relief panels and temples.

Jain craftsmen were masters in building temples; they were the jewellers of stone. They put a great precision and huge detail in their carvings. Studying Dilawar temple complex, Rajasthan (Jayantavijayaji 1955), it is most important for Jains to perform the pilgrimage. These temples are ornamented with detail carved figures and floral motifs as well as stone lattice. Luna Vasahi Temple Rajasthan India is a good example of chiselling in marble. The Ceiling of the temples are done with stone lattice design (see Figure 94). A carved lotus with thousands of petals Triangular with perforated slashes at a regular interval. This temple is example of stone lattice done during the construction of Jain temples. Hathiseeng Jain temple Ahmadabad India and Lodurva Temple Rajasthan India façade is decorated with mirror work; its architectural element is like haveli style (Yatin 2011). Stone lattice is being done in the window of first-story building beautifully carved (see Figure 95).



Figure 94: The ceiling of Luna Vasahi Temple Rajasthan has the minor detail of Latticework.
Source: "Savaari Blog." Savaari Blog. <https://blog.savaari.com/>.



Figure 95: Lodurva Jain Temple Rajasthan: Frantal Jali Work.
 Source: "Pin on Discover North India." Pinterest, March 8, 2017.
<https://pl.pinterest.com/pin/372743306646127768/>.

Latticework in Hindu Temples

Hindu architecture is also a breathtaking achievement of that time, as Hindu's architects and craftsmen built numerous wonders in the form of temples. They decorated the temples with different motifs including the gods and goddesses (Vardia 2008). Focus of the study is on the stone lattice, which was commonly used by the Hindu's architects. Stone lattice was used in windows, with a variety of designs, including railing, which allow light rays to be seen inside. Horizontal and vertical brick design (see Figure 96). Stone was the only material used by Hindus for construction. Excavating and cutting stone block are the major technical achievements linked with the history of Hindu temples (G. Michell 2007).

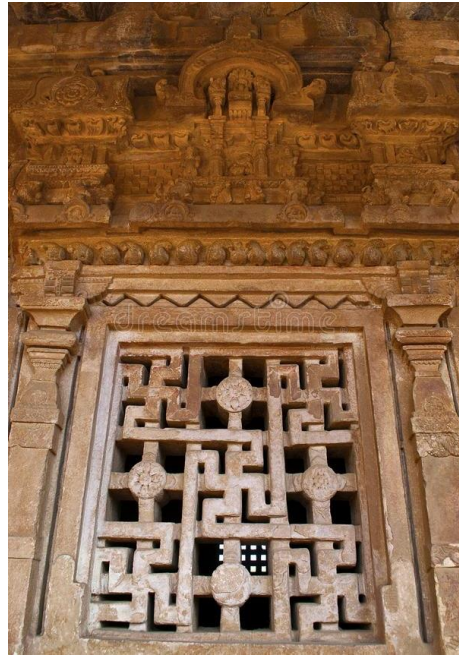


Figure 96: Latticework in a Hindu temple of Karnataka, India, depicting Swastika Design in the window.

Source: Limited, Alamy. "Carved Stone Window in Durga Temple , Aihole , Karnataka , India Stock Photo." Alamy. <https://www.alamy.com/stock-photo-carved-stone-window-in-durga-temple-aihole-karnataka-india-95880748.html?imageid=CDAD193F-D2DC-428C-8DEF-A17B8EC66CC5&p=148098&pn=1&searchId=ae181e23cdfcd25a344e9fe45eb8471&searchtype=0>.

Earliest Islamic Latticework

There are insufficient archaeological evidences about the earliest Islamic buildings in India that were built soon after the conquest of Sindh by Muḥammad-bin-Qasim in 8th Century A.D (J. Burton 2008). Somehow archaeological excavation was conducted at oldest city Bambhore, Sindh revealed the traces of the world's earliest mosque dating back to 727 A.D. Muslim conquest in India re-utilized the pillaged material from the destructed Hindu and Jain's temples. Qutab al-Dīn-Aibak (Mamlūk Dynasty) sponsored the Quwwat al-Islam Mosque in 1193 A.D at Delhi; Shamas al-Dīn Iltutmish played a key role to build the entire mosque. It was built on plinth of Rai Piathora's Hindu temple, material of that temple re-used for columns, walls, ceiling, and paving (Westler 2012). Maqsūra screen decorated with floral stone lattice in the form of Small Square in a series (see Figure 97). There are two pilasters under an arch, decorated with deeply engraved calligraphy; along with these motifs, there are some geometrical carvings. The whole screen panel is a true example of the earliest Muslim stone lattice in India. It was erected between Western Iwan²⁶, arches used for the first time. All the work was done by the Hindu artisans under Muslim direction. Minaret, which is known as Qutb Mīnār built as in contrast of polygonal outline mīnars located in Ghazna, Afghanistan.

²⁶ Liwan is a term used from ancient time into present which refers a long-narrow fronted hall.

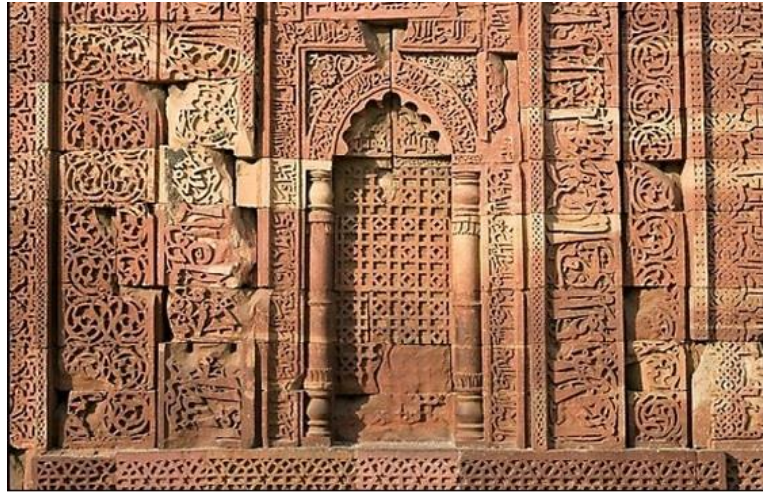


Figure 97: Maqsura at Quwwat al Islam (12th Century A.D).

Source: Picture/Photo: Wall Decor, ruined Quwwat-ul-Islam Mosque, Qutb complex. New Delhi, India. <https://www.terrageria.com/asia/india/delhi/picture.indi38636.html>.

Beside Masjid Quwwat al-Islam, three miles away, there is the tomb of Shamas-al Dīn Iltutmish built during his lifetime, which is one of the most beautiful examples of Persian art. It has a single chamber built in red sandstone and outer layer with grey granite (Ananda 2008). Tomb is enclosed in fortified square, with cenotaph along with flat ceilinged chamber in the center of court. There is pillared portico of beautiful design provided a mosque sanctuary having mihrāb and dome. Mihrāb is engraved with floral motifs and calligraphy. There is a small stone lattice in the center of two small pilasters and arch. This stone lattice is decorated with octagonal shape perforations.



Figure 98: Mihrāb Interior decorated with carved Motifs.

Source: "Iltutmish's Tomb - Picture of Iltutmish's Tomb, New Delhi." Tripadvisor. [https://www.tripadvisor.in/LocationPhotoDirectLink-g304551-d7216766-i443160400-Iltutmish s Tomb-New Delhi National Capital Territory of Delhi.html](https://www.tripadvisor.in/LocationPhotoDirectLink-g304551-d7216766-i443160400-Iltutmish_s_Tomb-New_Delhi_National_Capital_Territory_of_Delhi.html).

Latticework in Subcontinent Mughal Era

Mughal emperor Zahīr-ud Dīn Bābur 1483-1530 A.D laid the foundation of the Mughal empire as a result of war against Ibrahīm Lodhī in 1526 A.D (Helland 2006). There is no building in India yet identified that was built by Babur (Fergusson 1899). But several mosques are associated with his name like Babri Masjid, Panipat Mosque and the Jama Mosque. He was buried in a mausoleum located in Babur Garden, Kabul, Afghanistan. The first building of Mughal architecture is the tomb of Shaikh Muḥammad Ghaus 1565 A.D, which have the stone lattice on the window screens. The tomb is the first monument in India that has stone lattice (Nath. 1976). At Fatehpūr Sīkrī there are hundreds of panels decorated with Mughal's stone lattice, and the complex has only panel which is engraved with geometrical and stylized pattern (see Figure 99).

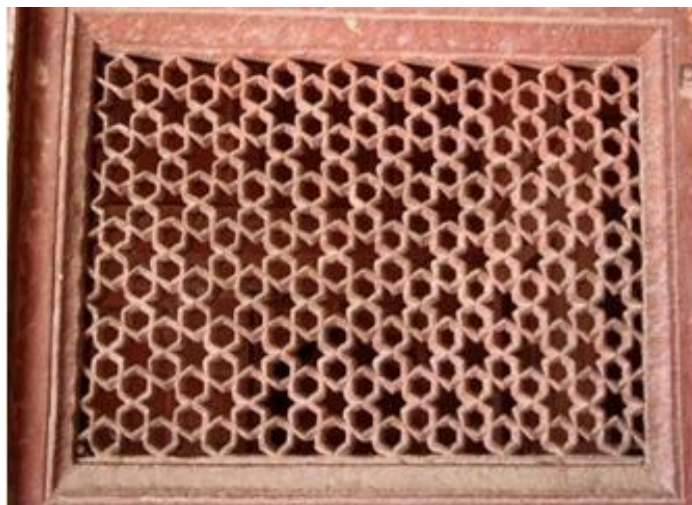


Figure 99: Jālī Work from Fatehpūr Sīkrī Complex (1571 AD).
 Source: "Lattice-Work in Fatehpur Sikri." Everything about Tourism Attractions in India!
<https://tapioca.co.in/lattice-work-in-fatehpur-sikri>.

Above that stone lattice, there is a horizontal border, a stylized reciprocal Chinese cloud-collar motif which is adopted from Timurid Art 15th Century A.D; design is filled with floral motifs (Chughtai 1963).

The earliest Mughal geometrical stone latticework belongs to the half of the 16th century A.D in Akbar's period. Two screens of stone lattice engraved in red sandstone depicted Girahsāzi²⁷ design, which is a typical example of Islamic art. A rectangular screen from Hawa Maḥal in Fatehpūr Sīkrī has the design of Islīmī-

²⁷ Girah Sāzi (making knots) is Islamic geometric pattern similar to the rope knots.

Khataī²⁸, adopted from Timurid (see Figure 100). The border of the screen is decorated with vine and leaf motifs. All the area of the screen is composed symmetrically with a single unit (Welch 1985).



Figure 100: Islīmī-Khataī Design at Fateh Pūr Sīkrī.

Source: Limited, Alamy. "Fatehpur Sikri, India. Hindu Swastikas and Floral Designs in Decoration Carved in Sandstone, Birbal's Palace Stock Photo." Alamy. <https://www.alamy.com/stock-photo-fatehpur-sikri-india-hindu-swastikas-and-floral-designs-in-decoration-47954322.html?imageid=0CF8D958-DA70-4604-83B1-E801293819EA&p=17678&pn=1&searchId=ebed7c41873b314ef5361da5f677da3b&searchtype=0>.

A Tomb of Salīm Chishtī in Fatehpūr Sīkrī is also notable for its stone lattice screens engraved with Girahsāzi design used to enclosed veranda. There are many designs starting from geometrical stars and polygons. One screen has an Islīmī design on spandrel rest of the screen is perforated with star-shape design.

The Tomb of Akbar located at Sikandarā has the important Mughal monument decorated with stone lattice. Tomb is enclosed in stone lattice tracteries of different geometrical motifs in white marble. Every stone lattice is unique due to minor details and fine carving, while pattern of the stone lattice is geometrical. Similarly, the red sandstone lattices can be seen in the Tomb of Jahāngīr at Lahore engraved in a geometrical design. In the 17th Century A.D, at the tomb of Itimād ad Daula in Agra, stone lattices were done in Girahsāzi pattern using white marble. Apart from the stone lattice, the later period of decoration was dominated by Persian motifs. Mughal art went through different phases of transition like Timurid-Safavid Islīmī-Khataī Indian and European design (Abbas 2016).

²⁸ Islimi Khatia or Arabseque is the Islamic geometric pattern based on foliate, floral or biomorphic designs.



Figure 101: Latticed Screen at Red Fort Delhi.

Source: Shah, Meiraj Ud Din. "The Sitting Place of Mughal Emperor Stock Photo - Image of Beautiful, Famous: 83326450." Dreamstime. <https://www.dreamstime.com/stock-photo-sitting-place-mughal-emperor-where-shah-jahan-used-to-enjoy-particular-people-image83326450>.

There are similar stone lattices which can be seen in Mūthamman Burj Agra Fort and Dīwān-i-Khaṣ Red Fort Delhi. But there is a new feature which was introduced as an exotic tracery. The fixed arch-shaped mīzān-i-'adl wall in Dīwān-i-Khaṣ separated horizontally, upper portion has stylized vegetal, and plant motifs, and on the other hand, lower portion has three latticed panels (vertical). Furthermore, six latticed panels dividing Jalī in unequal sizes. There are two vertical panels in the center decorated with perforated pattern having a plant and geometrical design. Lattice was copied from the Europeans, but the single stylized plant is the creativity of Muḡhal artesian (Walker 1998). Another Muḡhal artistical feature in lower panel locating centrally at Dīwan-i Khaṣ is perforated Screen.

In Tāj Maḥal, Agra, there is an enclosure around the cenotaph that looks incarnation of Muḡhal's stone perforation work (see Figure 102). The screen is decorated with European cartouches, a single case of Italian influence (Simth n.d). Framing border of the screen is decorated with *Parchīnkārī* ²⁹ applied on two acanthus leaves on both sides facing each other.

²⁹ Parchīn-kārī or *Pietra-dura* is a technique used for inlay work of highly polished stones or glass.

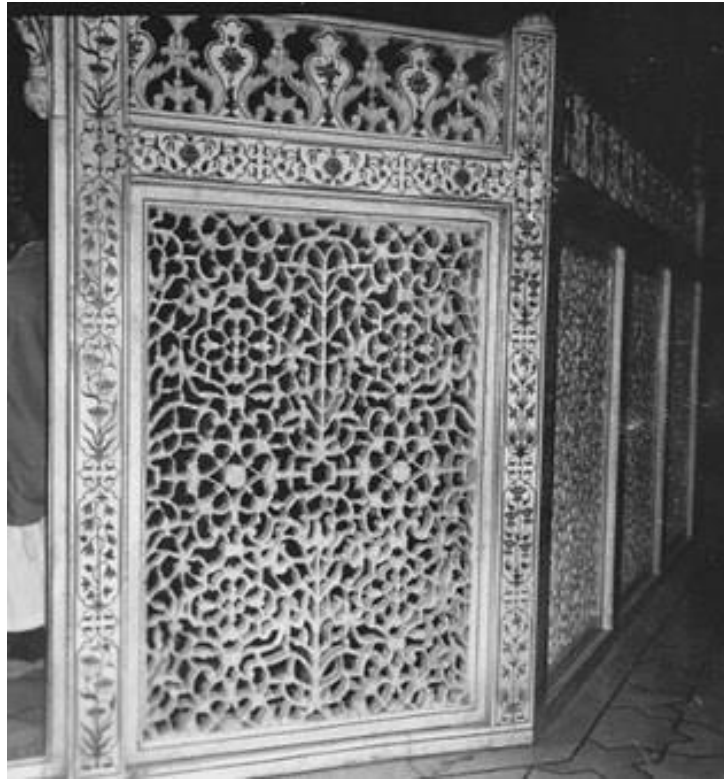


Figure 102: An Enclosure around the Cenotaph Tāj Maḥal, India.

Source: "Stone-Carved Jali Screen around the Cenotaphs in the Taj Mahal's Main Tomb, Agra, Uttar Pradesh, India, 1965-2000." [digitalcollections.lib.washington.edu](https://digitalcollections.lib.washington.edu/digital/collection/ic/id/10172/).
<https://digitalcollections.lib.washington.edu/digital/collection/ic/id/10172/>.

Latticework at Shīsh Maḥal, Lahore Fort

Studying the stone lattice in Shīsh Maḥal, Lahore Fort, a change was noticed in the design of screens. Large Jālī in the palace is set under an arch-shaped entrance, decorated with geometrical designs. The division of the white marble screen is done by the three vertical panels, further divided horizontally, with a window at a lower level, enclosed in the single plant motif. Pattern from early Muḡhal era is rectilinear, and curvilinear were also applied. On the central window, a cloud motif with a curly end are fixed with a grill frame (see Figure 103). Windows are constructed with multi-foil arches on a geometrical layout. Latticed windows are decorated with the cloud collar design³⁰ at Naūlakḥa Pavilion in Lahore Fort. Plant motif on lower panel looks like as it is painted on the surface and is also used in the 2nd half of the 16th Century A.D. Studies shows that the plant motif is secondary element in Muḡhal's art which is depiction of European herbal illustration. Muḡhal artist utilized this motif for different decorative purposes. These plants are used for stone lattice in white marble at Shīsh Maḥal, can also be traced in Naūlakḥa Pavilion. Here a rectangular panel is decorated with two plants side by side covering the whole

³⁰ Cloud collar," is the later Chinese name for a four-lobed (more rarely eight-lobed) pattern of considerable antiquity

area. Terrace fencing of the Shīsh Maḥal has white marble lattice screen with geometrical hexagonal patterns. The same pattern in a rectangular screen is used for the inner courtyard of Shīsh Maḥal, but this time the material they adopted is red sandstone. After Mughal emperor Shāhjahān, the stone latticework declined, having no prominent evidence from the reign of Aurangzīb.



Figure 103: Shīsh Maḥal, Lahore Fort: Masterpiece of Stone latticework and Cloud-collar design.



Figure 104: Shīsh Maḥal Lahore fort: lattice window with cloud-collar design.

Types of Latticework

Stone lattice is being used in partition screens and in windows as it is an important element of our traditional architecture. Mughals were the ones who introduced stone lattices in their palaces and forts. But now, this work is used in different materials and designs.

The materials used are wood, stone, marble, terracotta bricks, cement, concrete, steel, acrylic, PVC, granite, sandstone, copper, aluminium, ceramics, and onyx. These materials have different properties, and perforation applied on these materials gives different aesthetics as well as have different functions.

Types of latticework based on different geometric shapes and design

Latticework has been divided into six types according to its design for the temple architecture back in the early medieval time period (Nath.R 1985).

1. **Gonetra:** semicircular and triangular lattices or pierced screens.
2. **Hestinetra:** for square and rectangular-shaped screens
3. **Nandyvartaa:** swastika-based pattern
4. **Rjukriyam:** straight-line geometrical design
5. **Puspakarna:** floral design
6. **Karnaa:** curvilinear patterns³¹

The first two types are based on the form of lattices, and the other four types are based on the different patterns for the lattices.

The latticework in the architecture of Gujrat, India, during the sultanate period have small square panels fixed together to make a large lattice screen (Nath.R 1985) These square panels have further three basic types of patterns

1. Geometric
2. Combination of geometric
3. Curvilinear (medallions)

Symmetry is being maintained in all these patterns. These Gujrati patterns of latticework are also applied in the Mughal period.

³¹ All the terms are in Sanskrit Language as practiced in Hindu's Architecture.

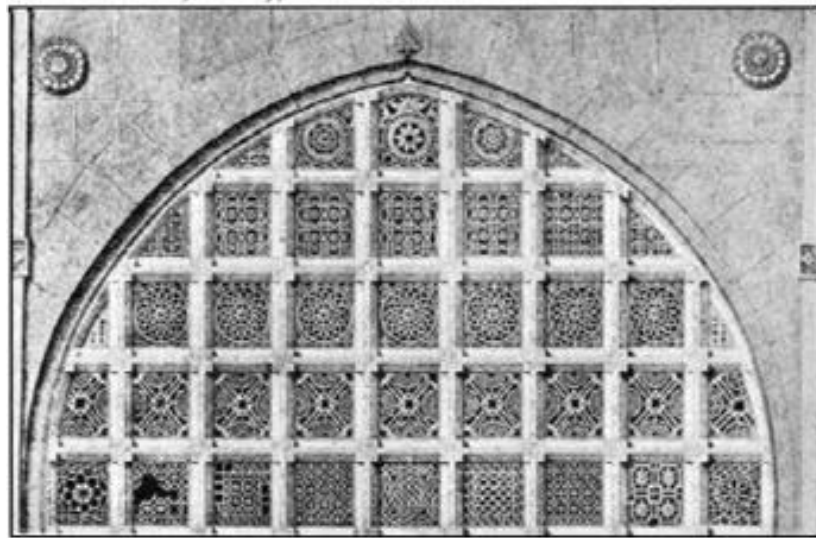


Figure 105: Square Jāli Screens with an Arch Composition at Mosque of Sidi Sayyid, Ahmadabad (1572-1573).

Source: “Indo- Islamic Architecture in Gujarat.” IndiaNetzone.com.
https://www.indianetzone.com/37/indo_islamic_architecture_gujarat.htm.

The Gujrati lattice style of 14th-16th century A.D was known for its extreme enhancement and for its rhythmic compositions. The arch shaped with curvilinear patterns on stone lattice decorated with trees.

1. The central tree has a heavy trunk, with branches spreading over the whole part with enormous growth of stems, tendrils, leaves, offshoots, and floral motifs.
2. A palm tree crowned by stylish palm leaves.

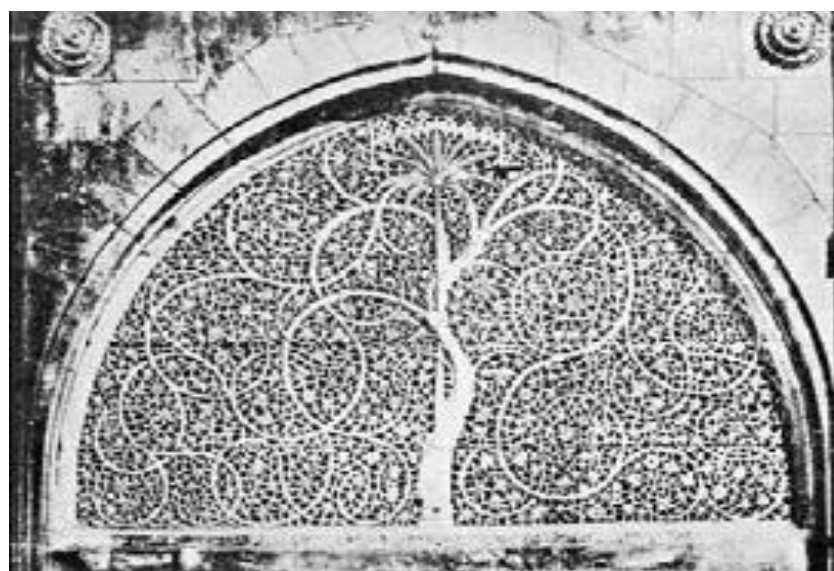


Figure 106: Jāli Engraved with a Tree of life motif at Mosque of Sidi Sayyid, Ahmadabad (1572-1573).
 Source: “Intricate Lattice Work Window at Sidi Saiyyed Mosque, Ahmedabad - Unknown Maker(s) - Google Arts & Culture.” Google. https://artsandculture.google.com/asset/intricate-lattice-work-window-at-sidi-saiyyed-mosque-ahmedabad-unknown-maker-s/cQGgaI7lEHIS_g.

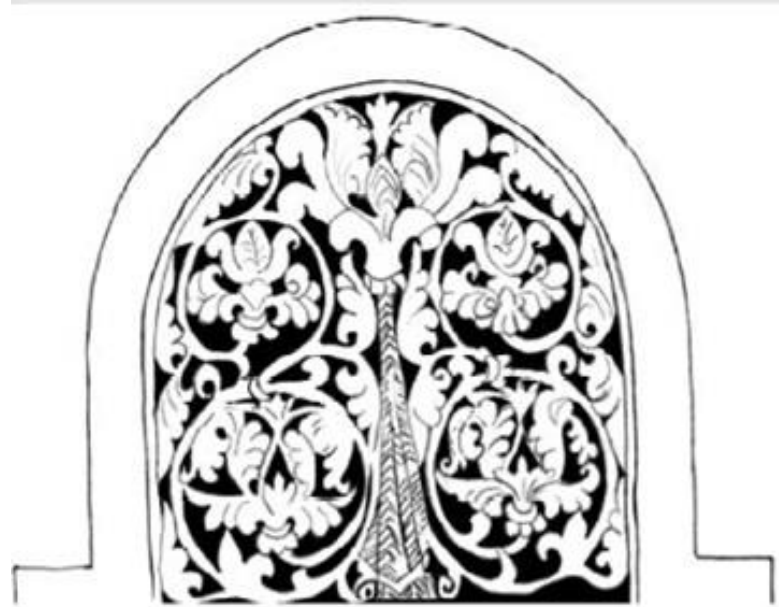


Figure 107: Jali Window at the Palace of Qasr al-Hair Gharbi near Palmyra, Engraved with Tree of life motif, half palmettes, and a vine with acanthus leaves.

The Gujrati stone lattice-making tradition is totally based on Hindu artistic patterns, and it keeps its ornamental vocabulary of its own. It is different from Mughal interwoven complex stone lattice designs. However, some of these patterns of latticework were being applied in the Mughal period. Mughal's stone lattice retains their characteristics and reflects the ornamental vocabulary of the court (Welch 1985).

The Muslims used these screens for various functional and artistic purposes at the beginning of the 14th century A.D in the subcontinent. The Mughal used these stone lattice with different geometrical patterns and plant-based patterns fitted into the window arches (G. Michell 2007).

These stone lattices and windows opening shows three types of geometric interlacing,

4. One of the patterns is based on the central star hexagonal shape with squares and triangles interwoven, also found in interior carvings.
5. The second one is having a design of interlacing hexagon, where the lines on both axes are crossing each other in the center of an octagon, that creates an overlaid square.
6. Third design seems like ribbon shape.

Most of the perforated screens are inspired by Persian designs in various courts of Mughal's buildings. These screens comprised both geometrical and stylized patterns. During Akbar's period, the screens in red sandstone were being used with not only geometrical but curvilinear patterned trellises. Above these geometrical

lattice panels, there is a horizontal border which has stylish Chinese cloud-collar motif filled with a floral shape style and which was taken as an inspiration from Timurid art of the 15th century (Nath 1982).

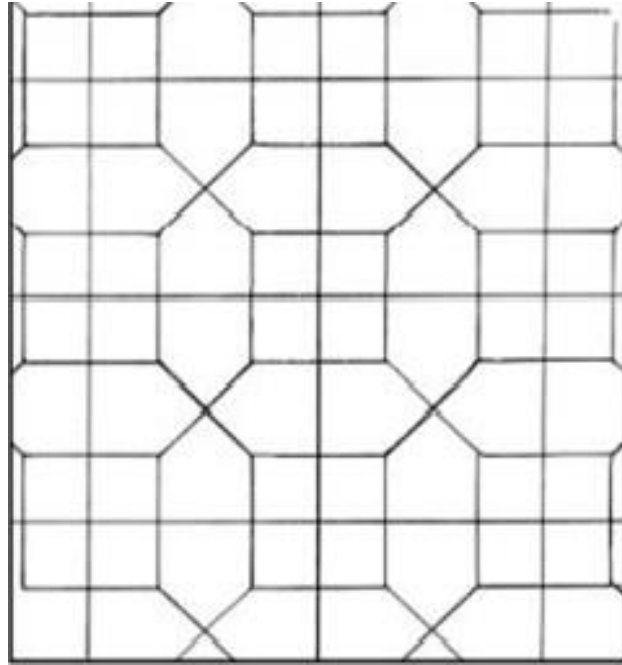


Figure 108: Jali Work in White Marble with Geometrical Pattern Interlacing Octagons at Alai Darwaza, Delhi (1305).

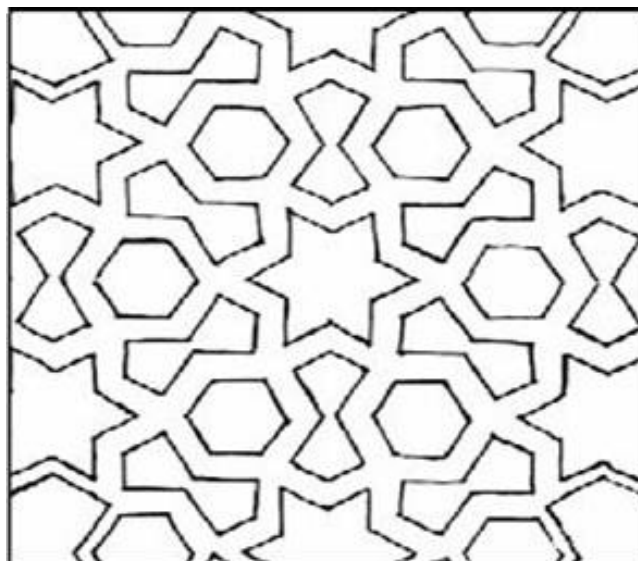


Figure 109: White Marble jali engraved with Geometrical Pattern at Alai Darwaza, Delhi (1305), with star-hexagon shape.



Figure 110: Reciprocal cloud collar motif in a latticed screen at Tomb of Sheikh Muhammad Ghous (1565).

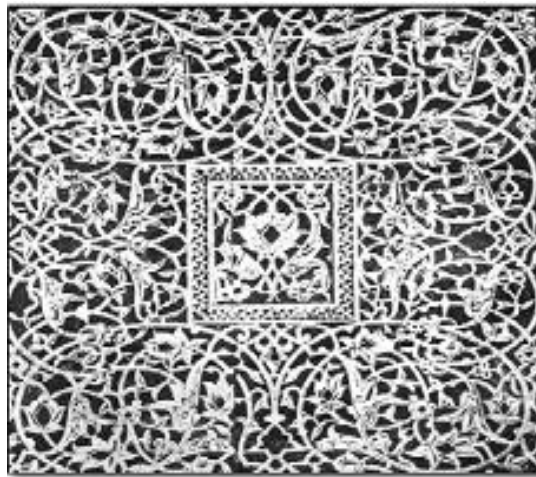


Figure 111: Jalī screen with Timurid Islimi-Khatai design at Hawa Mahla, Fateh Pur Sikri (1565-1570).

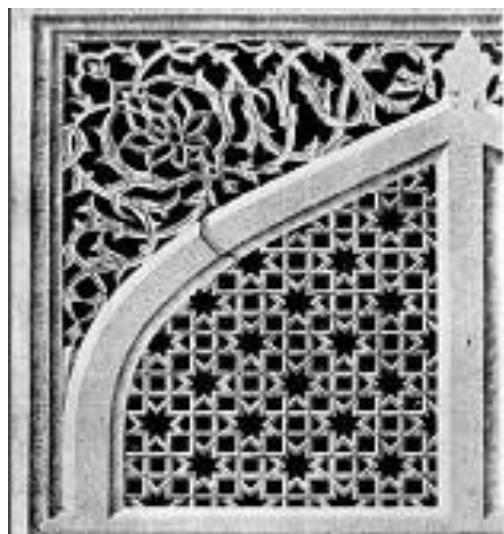


Figure 112: Fretted Trellis engraved with geometrical and curvilinear designs placed in a Verandah in the Tomb of Salim Chishti of 1571-1581 at Fateh pur Sikri.

In beginning of the 17th century, A.D the new Muğhal decorative styles of stone lattice adopted the variety of patterns with geometrical stars in a group and interlaced polygons.

The further change in stone lattice were first noted in the mid 17th century A.D at Lahore Fort. The stone lattice screens are divided horizontally and vertically in different panels. Most of the screens have simple geometric patterns, however, in central lower panels with single plant motifs, made an enclosure for the window. It is observed that the same earlier latticework, followed honeycomb pattern as well, using either hexagon or octagon in a complex tessellation (Nath 1994).



Figure 113: Single Plant Motifs in a White Marble latticed Screen from Naulakha Pavilion, Lahore Fort 1631-1632.



Figure 114: Fretted Trellis engraved with geometrical and curvilinear designs at Lahore Fort.

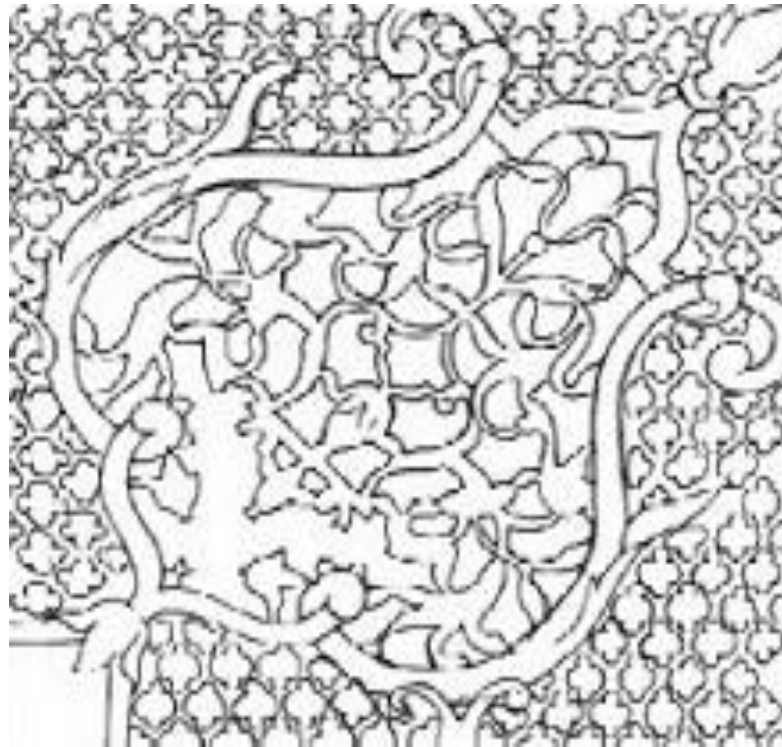


Figure 115: Ovoid Cartouche Design from Diwan-e-Khas of 1639-1648 Red Fort, Delhi.



Figure 116: Jali Panel composed with Fretted pattern decorated with stylized plant motifs, Diwan-e-Khass, Red Fort, Delhi (1639-1648)

The Naulakha pavilion of Lahore fort is considered as a good example for the stone latticework used inside (see Figure 117). The center of pavilion has carved marble lattice ornamented with *Pietra-dura* work. The stone lattice used in pavilion

also has a complex design of honeycomb pattern that is carved out from the white marble. The different panels show different layouts of stone lattice using same honeycomb pattern (Selcuk 2018).

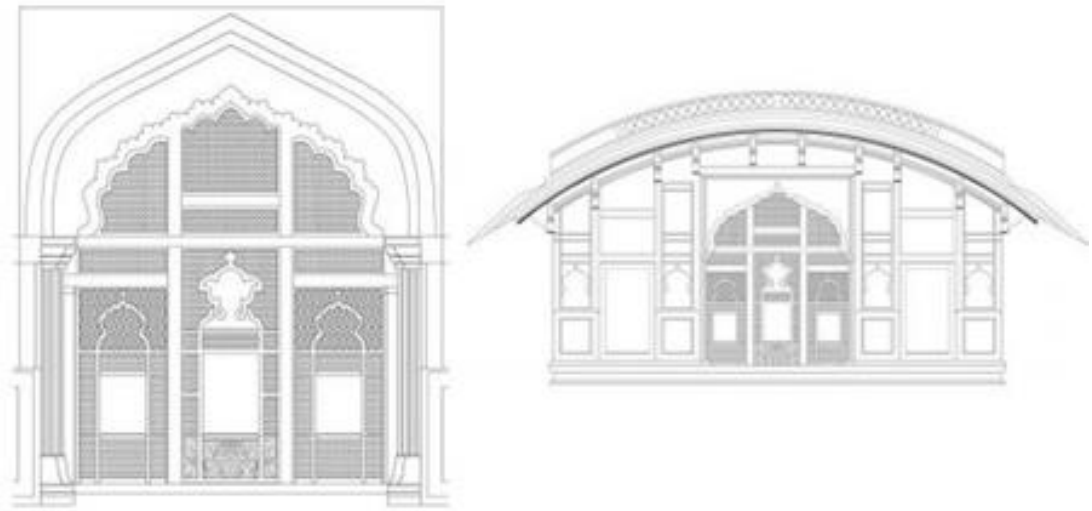


Figure 117: The Jalī Design in Naulakha Pavilion of Lahore Fort: Drawings of the Pavilion.
Source: Reki, M., Selçuk, S. A. (2021) " Exploring New Forms with Parametric Patterns for Responsive Facades: A Case on Kinetic Jali Design", *Periodica Polytechnica Architecture*, 52(2), pp. 205–224. <https://doi.org/10.3311/PPar.17748>

Process of Stone Latticework

Ancient Indian artists were experts in sculpturing; since the 13th Century, the western world understands this tradition by examining the marks on carved stone left by the tools that were used during the carving (P. Chandra 1985). It is easy to draw a picture about the nature of the tools used in ancient times. In many studies all over India which highlight the process behind the carving of stone art tradition, the high-level skill and expertise of Indian artists are noticeable. According to Rockwell's the carving of a stone is a subtractive process; proper planning is needed for this process because mistake cannot be undone. It is important to understand about the stone's nature and hardness. This factor is an important key to choose a tool according to the stone's nature. Variety of tools for the single stone carving with a series of different step matters in stone lattice (Rockwell and Dehejia 2016).

Furthermore, stone carving is a conservative craft, as only few methods are available to carve stone. The technique is quite similar around the world as well as throughout history. In the process of stone carving technique, chisels are commonly used with flat or pointed end, axes, or picks for quarrying. There are regional differences in the techniques of stone carving around the subcontinent. An important

factor that a carver prefers is that what kind of tool for carving and process he needs. It is up to the stone nature which is being carved (Rockwell 1993).



Figure 118: A Carver using a Chisel and a hammer to shape a stone.



Figure 119: A Completed Latticework Decorated with Geometric Patterns.

Three categories of tools for the stone carving are being used—the percussion, abrasion, and laying out tools. The tools sizes are not fixed; carvers use different versions of the same tool. Sometimes the tools are reshaped when required. For example, a flat end chisel can be turned into round end or roundel end by simple cutting of corners and sometimes shaping the chisel into a tooth chisel.



Figure 120: Variety of Traditional Chisels used for Stone Carving.

Traditional Tools

Pointed Chisel

It is known as Taglā in native language. It is a tool made up of metal as a chisel with a shaft which measures 20-30cm long and 2.5cm in diameter. Its one end has pyramid shape point, depends on the material for which it is used. It is different for other material. Elongated point is used for marble and limestone, but granite is process with a blunter point, the second side of the chisel is round or flat. This tool is used in a combination of hammer, because it is the basic chisel use for many types of carvings. This pointed chisel is still used in modern time.



Figure 121: A Set of Pointed Chisels.

Flat Chisel

It known as *ṭhālāk* in native language. This chisel is similar to point and tooth chisel, also used in a combination of hammer to strike the stone. It has a shaft 15-25cm long and has 1-2cm diameter with sharpened flat cutting edges, these are perpendicular to the shaft. Usually, it is used in angle of 35-60° on the surface of stone but can be used in various angles. The traces of flat chisel left behind the stone are smooth parallel lines. It is also used in modern time to create lattice.



Figure 122: A Set of Flat Chisels.

Tooth Chisel

This chisel is known as a *Dachā* in a native language. Tooth Chisel has a shaft of 16-22cm long and 1 or 2cm in diameter, with toothed edges at one end. It is used with metallic or mallet hammer. The number of teeth in the chisels are 3-5, but sometimes it has only two teeth. It removes marks that are left by the chisel. It is also used to give a rough shape to the stone slab. Modern carvers use this traditional tool with a combination of modern equipment's.



Figure 123: A Set of Traditional Tooth Chisel.

The carving process starts with the chiseling of the large chunks of stone. This process is known as pitching or roughing out. Point and wedge chisel are used along with the hammer to pitch the chunk. After applying this technique, a rough form emerges, and carver marks with a piece of charcoal, pencil, or crayon on the stone to give a perfect shape. Hammer and pointed chisel technique is used to put a detail work and more definition. The several other tools used for the process are toothed chisel, rasp, claw chisel, saw to give it a proper shape.



Figure 124: Carver is removing the Chunks with the help of Hammer and Tooth Chisel.

Therefore, in modern times carvers use these traditional tools like pointed chisel *Tagla*, flat chisel *Thalak*, and tooth chisel *Dacha*, along with mechanical tools. Stone carvers adopted advanced equipment for this process like oxy-acetylene torches, laser or jet heat torches, electric power cutting saw, grinders, and polishers. These tools are also available in small size for miniature work.

Now a day various percussion tools are used to create a lattice. These tools are directly struck against stone, are used by the carvers to hit the stone directly, as compared to the chisels, which is struck with a hammer or mallet. It is used in all types of processes in stone carving, except polishing. The following tools are being used in the process of percussion.

Quarry Pick

This tool is used primarily to separate extra material from the stone, having a wooden handle up to 70-80cm in length. This tool has a point on the end possibly two

sided. Its point is similar to chisel, but the length of a handle allows carver to use it with extra force.

Sculptor's Pick

This tool is like quarry pick, but it's a miniature version. The handle is about 40cm long to 60cm long. The metal tools have a pointy end sometimes or can be both. This tool is two-hand pick, and the pointed end strikes the stone slab vertically, leaving marks similar to the chisel.

Wedge

Another tool is used in the percussion process, made up of wood or metal to split the stone. The wooden inserted into a hole with points and then soaked into the water. This process expands the wood and force the stone to split half leaving behind natural bedding lines.

Roundel

It is similar to the flat chisel, but it has a curved edge, also known as bullnose chisel. This tool is used with wooden or mallet hammer. It has a shaft of 15cm and 1 cm in diameter. It is used for rough and smooth work.

Hammer

All of the above-mentioned tools are used with hammer; most of the hammers are made up of metal or wood. But the earlier hammer was simple stone to struck. The size of the hammer's head depends on the nature and hardness of the stone because different tradition has different hammers.

Axe

The cutting edge of the chisels on the tools listed above can also be found in axe. The quarry pack is like an axe similar to the Point chisel. Flat cutting edge of the axe are aligned with shaft. This is used for the rough shaping or making squares, used for limestone and sandstone.



Figure 125: A Set of Modern Tools are used in Latticework.

Abrasion Tools

After doing the percussion, the second step for the stone carving is the tools which precisely rub at the stone. It is used for cutting, smoothing, or polishing, and for making holes.

Saw

Saw is used for all kinds of stones for creating thin panels for flooring or wall revetment. This saw has long and thin blade, 0.5 centimeter wide and 2 meter long. The size of the saw depends on the nature of work, the operating method for the large saw is by two people, and the small saw can be operated by a single carver.



Figure 126: Small Saw used in Fretwork Screens.

Drilling Machine

It is a mechanical tool and used historically for drilling in stone. It has a uniform diameter of the hole throughout the depth. The mechanism consists of a drill similar to the chisel, shaft connected with a wooden handle for is free movement.



Figure 127: Traditional Drill use for making holes.

Rasp

asp is like a file, modern rasps have double-sided having the length of 12-40cm, it has a small shaft connecting handle to rasp body and two ends covered with shaft points. End can be rounded, pointed or square, curved or flat. There is a variety of rasps exits for shaping or smoothing.



Figure 128: Rasp used in Stone Carving.

Scraper

This tool has toothed or flat ends, similar to a flat or tooth chisel, it has a curved end, so it is easy to drag the tool on the surface of the stone. It leaves the marks of parallel lines behind like a criss-cross pattern.



Figure 129: Scraper used in Stone Carving.

Abrasives

The abrasive was used to get polished, and smooth surface of the stone, variety of abrasive can be used for the purpose. These abrasives can be coarse material (emery) to softer material like pumice or sandstone. These abrasives are used with water to remove the dust created on the surface of stone. In order to get an extreme polished surface carver, use rough to fine abrasives. Modern carvers use different kind of manufactured abrasive to polish the carved stone. These are sandpapers, emery paper, and acid. Power tools are used to save time and apply polish. Artificial polish is also used with a thin layer of wax.

Analysis

All the process goes step by step. Initially craftsman selects a raw marble for slicing unit, where huge machinery is planted with a large cutter to make a perfect slice of the stone. The slice depends on the design, whether it is square or rectangular. Stone slices are moved to the next Unit, where a craftsman, draw a sketch of design for stone lattice using a pencil and a readymade fragment of a design. Craftsman used different fragments of the design to draw on a complete slice. Sketched stone slice is ready to be fretted, and craftsmen used different tools, including powered drill and cutter, a set of different chisels, hammer. This process needs a high-level expert to engrave accurately and take time to complete. After being done, the final process began with polishing, different material and tools are applied on the latticework. Files, sandpaper, and buffer machine depend on the craftsman. Nowadays, polishing of the stone is much easy. Sometimes they only apply synthetic polish on the surface and buff with the help of the machine, to provide a better shiny look and smooth surface.

During the Mughal period, craftsman was bound to the limited tools which were operated with a lot of effort and energy. They followed the same process which

are still used in the modern technique, in the selection of the raw material. There were no powered tools or huge machinery for cutting slice of the stone. Wedge tools were adopted by the craftsman to slice a marble. The whole process of the stone latticework was divided into sections step by step. Every craftsman was allotted a single duty to do. After breaking the stone into half, another craftsman hired to give a proper square or rectangular shape to the slab. They were familiar with the flat chisels and files to provide a fine look. Then there was another artist who were responsible for sketching different design on the slab with a piece of charcoal. After marking the slab, stone lattice used to be done with a variety of small and chisels and hand drills. There were no power cutters or drill to do it faster. It was a difficult task to work on the surface with only handheld tools. Hammer was the master tool used with the combination of different chisels. At the final stage, after the work being done, the polishing process was done with the help of abrasive material. There were no Sandpaper and Buffer machines. They used sand and files to rub the surface with time to time for getting a extra smooth and shiny look. Mughal's Craftsmen were highly expert in marble work.

Analyzing these modern and historic processes, the study concludes that there was not such a difference between Modern and Historic Stone latticework except tools. Many tools which were used by the Mughal's craftsman-like variety of Chisels and Hammers are still in use nowadays. Modern machine work is a new addition with historic tools to improve quality and save time.

Chapter VII

Stone Tessellated Floor (Pachīkāri)

Historical Background

The word tessellation is derived from the Latin word tessellar that mean to pave or tessera³². It is also known as Pachīkāri in the Persian language. It is the ancient Persian technique of marble tessellation in combination with different colours of stones. The technique of stone tessellation is adopted from the stone inlay work or stone mosaic. The earliest example of tessellated work goes back to the Sumerians 3400-3100 B.C; they used small clay tiles to create a pattern on the wall of the tombs 4000 years ago (Picover 2012). During the early period they used wood, but they also practiced schist or slate (steatite) with light colour limestone inlay. This technique was used for both square and rectangular panels. The inlay art was found in Uruk in the late pre-historic period, where they installed clay tiles to the wall of a temple to create geometric patterns (Moorey 1994). It was followed by the Romans in the form of small quadrilaterals to make games and mosaic work.

In Umayyad's time, they copied the western architectural elements to erect their monuments until the late 10th century A.D. At early stage, they used marble slabs and marble mosaic to decorate their walls at Damascus and Jerusalem. Above statement points that the tessellated floor work was done at the Dome of the rock and Umayyad Mosque's courtyard at Damascus. They used marbles slabs about seven meters high and inlaid with different colours of stones to create beautiful tessellation. In this regard, it is clear that the western craftsman were hired to ornate the mihrāb and the dome chambers with tessellated stone work (Kuhnel 1966).

Tessellated floor work is not introduced by the Mughals in India, but it appears in the building constructed before the Mughal's arrival. Islamic influence started in India when the Arab traders arrived subcontinent in the early 7th century A.D. After Arab merchants, Turks contributed significantly in different ways to the Islamic civilization in India. They adopted art and architecture which were not similar to the pure Indian style. An Indo-Islamic style of architecture was introduced with a mixture of Indian and Turkish styles. Turks laid the actual foundations of Muslim art and architecture across the sub-continent. They established themselves at Delhi in the

³² Tessera is a very small square tile of stone, glass, etc, used in mosaics, and smaller than a tessera.

last decade of 12th century A.D; they came through Afghanistan. They brought their art, architecture and tradition along with them and utilized with local traditions, themes and techniques (Nath, History of Sultanate Architecture 1978).

Muslims learnt this technique of stonework from the western architectural practices, especially when Umayyad's got the European regions and adopted and implemented their architectural elements. During the 11th Century A.D, tessellated stone art began in central Asia. Initially, they utilized the art on the surface of the vessels and pots. It can be noticed that most of the sub-continent rulers were central Asian and came to South Asia, so they copied and practiced their art and architecture. They build several monuments and practiced inlay art; later on, the inlay artwork modified with the time span and used for flooring with different colours of stones, probably marble.

Types of Tessellation Art

The tessellation art is applied in architecture to decorate the walls, floor, ceilings and pillars. It belongs to the field of mathematics because of the geometrical patterns. Basically, tessellation is the study of “tiling” to be placed without gaps or overlapping shapes. The discipline belongs to mathematics which has been practice since the early 17th century A.D to till day. The tessellation art is classified as;

Two-Dimensional Tessellation

Tessellation in two-dimension states desired artwork of two-dimensional surface or a plane. This type of tessellation can be further classified in the geometric patterns, which are known as prototypes.

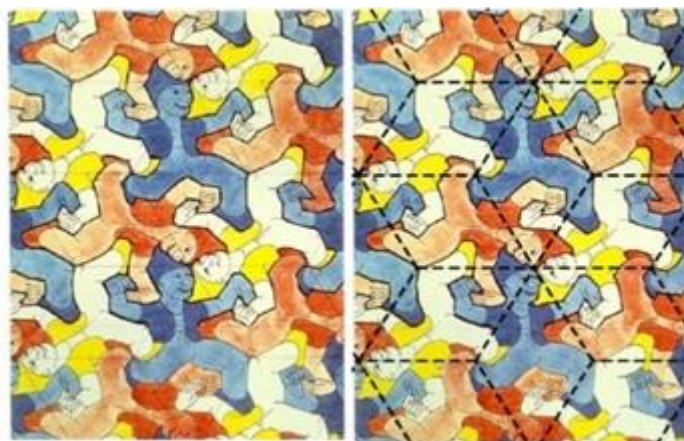


Figure 130: Example of two-dimensional Tessellation.

Symmetry and Periodic tessellation

The basic tessellations include some certain symmetry which refers to, a geometrical pattern, object or figure that has a regular repetition. It is further classified into four subcategories are;

- Translation symmetry
- Rotation Symmetry
- Reflection Symmetry
- Gliding reflection symmetry (Lynn 1999)



Figure 131: Translation Symmetry.



Figure 132: Example of Rotational Symmetry.



Figure 133: Example of Reflection Symmetry.



Figure 134: Example of Gliding Reflection Symmetry.

Tessellation with this type is also known as periodic tessellation, e.g., regular hexagon tessellation. It seems like lattice with simple expression. The common element of the translational symmetry, plane period tessellation, has the elements of rotational, reflection and sliding symmetry.

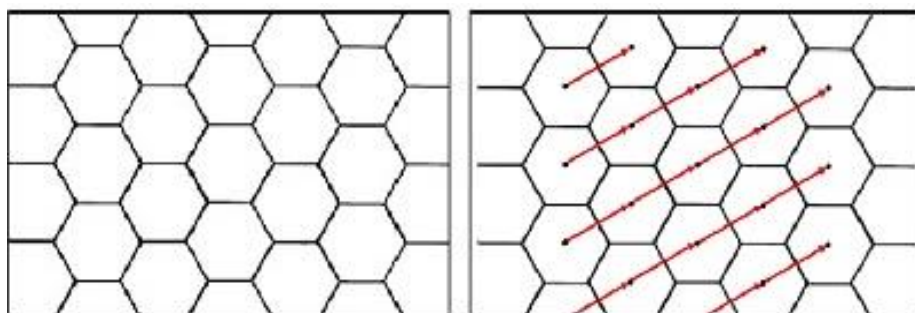


Figure 135: Traditional Symmetry Elements of a Hexagon Tessellation.

Aperiodic Tessellation

It is similar to the translational tessellation patterns with the translational symmetry as assembled in the Figure. The figure has rotational symmetry without translational symmetry. A similar type of the tessellation work includes:

- Penrose aperiodic tessellation
- Pinwheel aperiodic tessellation
- Robinson aperiodic tessellation

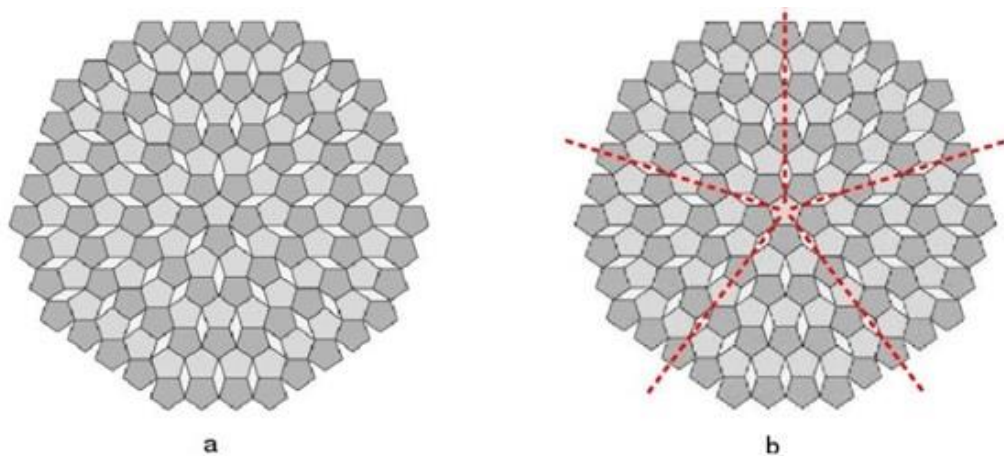


Figure 136: Example of Aperiodic Tessellation.

Fractal Tessellation

Fractals and tessellation are two different fields in mathematics; it can be combined to form different types of shapes comprising both fractal and tessellation elements. Such type of shapes are known as fractal tessellations (Fathauer 2002).

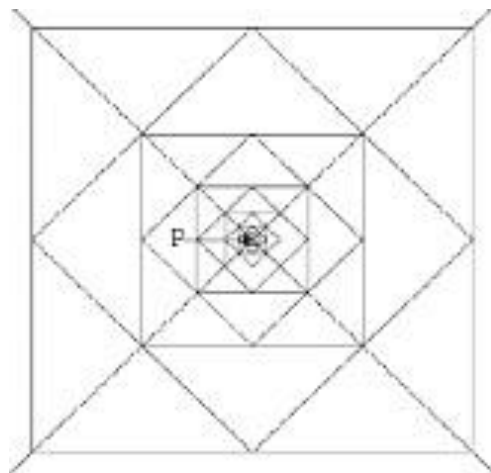


Figure 137: Example of Fractal Tessellation with Isosceles Right Triangles.

Radial Tessellation and Spiral Tessellation

A prototype which can transform into concentric circles is another method to create the aperiodic tessellation; such type of tessellation is known as radial tessellation. Spiral tessellation can be done with a shift in a radial tessellation.

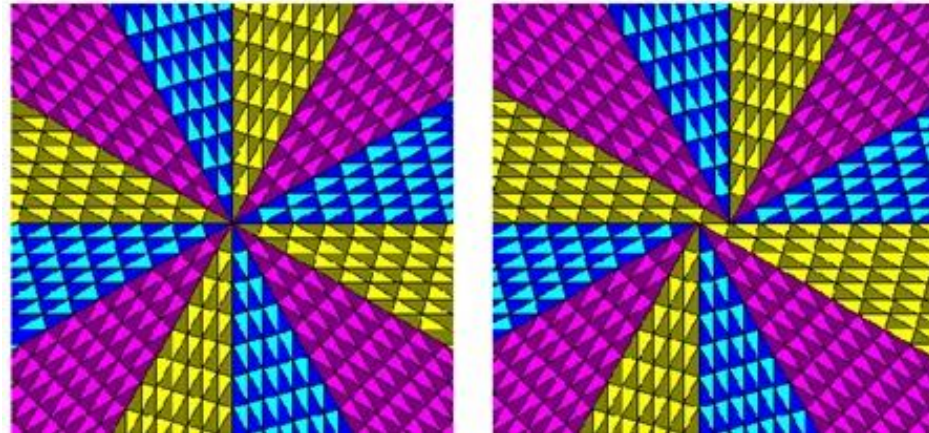


Figure 138: Example of Radial and Spiral Tessellation with Isosceles Triangle.

Three-Dimensional Tessellation

It is also known as a spatial tessellation; it is a complex design and has various dimensional variations as compared to the two-dimensional. It is further divided into two subcategories.

Crystal structure and Quasicrystal Structure

As compared to the two-dimensional tessellation, translational symmetry is the base to create three-dimensional tessellations. In the crystal morphology, internal structure of the crystal is created with geometric rules. The non-crystal structure is created without following the rules.

Quasicrystal structure does not have the elements of translational symmetry, but some elements repeat in different positions and directions. It follows Bravais law to create a geometric pattern of polyhedrons.

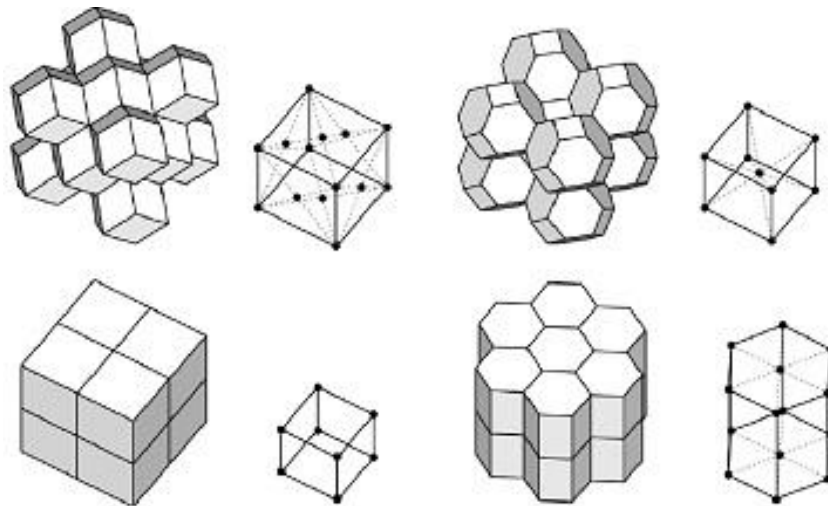


Figure 139: Example of Crystal Structures.

Danzer Tiling

In the tetrahedra structure consisting A,B,C and K, all these triangles have the specific direction and size. Each of the triangles can be converted into Danzer tile of the smaller proportion. Various combinations of the tetrahedra can create a variety of rotational symmetry into three-dimensional aperiodic tessellation.



Figure 140: Tetrahedra and Expansion rate in Danzer Tiling.

Geometry is an important architectural element in Islamic art and architecture. Star and polygons shapes are used in most of the architectural decorations. Geometric patterns are the complicated decoration. Mughals used simple rectangles, polygons and complex interlace of irregular patterns and stars, including 6 to 10-point geometric shapes. These shapes are applied to decorate the floor of palaces, tombs and mosques. There are only four basic shapes used to construct complex patterns are, circle and interlaced circles, squares and star shapes. The following geometrical shapes are:

6-point Geometrical pattern	8-point Geometrical pattern	10-point Geometrical pattern
 Hexagon	 Octagon	 Decagon
 6-point Star	 8-point Star	 10-point Star
	 8-fold Rosette	 10-fold Rosette

Figure 141: Sample of 6 to 10-point Geometrical Patterns.

Floor Tessellated work during the Mughal Era

Mughals introduced new techniques for the decoration of their erected monuments across the sub-continent. They constructed numerous structures and adopted different features from the local culture, traditions, material and technology. Their architecture is a mixture of local Islamic, Persian and Hindu (C. B. Asher 1991). They ornated their buildings with different architectural elements as well as stone tessellation which is the remarkable architectural feature of Mughal architecture in India. During the reign of Mughals, stone tessellation work got its perfection. They used the same technique for the stone tessellation work as they practiced for stone inlay or stone mosaic.

The marble tessellation has a history to get developed under the Akbar's reign; the craftsman used floral and geometrical patterns. They built Jami masjid in 1571 A.D at Fatehpūr Sīkrī, which is the largest mosque of India ornated with marble inlay work (Brown, Indian Architecture (Islamic Period) 1956). The courtyard of the mosque is approximately 300' feet, built on a natural rock by 5000 craftsmen in the period of six years. Tessellation work of the courtyard is done with rectangular and bar shape tiles of red sandstones. Bar shape tiles are used to create rows in the courtyard. The façade of the gateway has the marble inlay on the surface of red sandstone ornated with stylized sunflowers and geometrical patterns.

The tomb of Humāyūn at Delhi was built by his first wife Empress Bega Begum or Hāji Begam in 1569-70 A.D. The building is built in rubble masonry on a square plan. It has the stone inlaid work on the surface of red sandstone provided to that façade with different geometrical patterns. Tomb has the entrance through the

double-storied gateways to the west and south with height of 52' feet. It has rooms on the both sides of the pathway along with the small courtyard provided on the upper floor built in red sandstone, white and black marble (see Figure 142). Courtyards of the tomb are built in red sandstone tiles of different shapes paved vertically and horizontally. In the main building of the tomb, around cenotaph, a square platform is bordered with black marble. Inside the bordered area, two geometrical patterns are arranged to form a floral design paved in black marble (see Figure 143). All the arches surrounding the cenotaph has the same floor ornamentations paved in black marble.



Figure 142: Tomb of Hāmāyūn at Delhi ornated with marble inlay on the Red Sandstone Surface.
 Source: Jain, Aditya. "Humayun Tomb Editorial Photography. Image of Value, Tomb - 117005397."
 Dreamstime. <https://www.dreamstime.com/humayun-s-tomb-one-most-oldest-important-building-history-india-was-created-under-mughal-rule-now-taken-image117005397>.

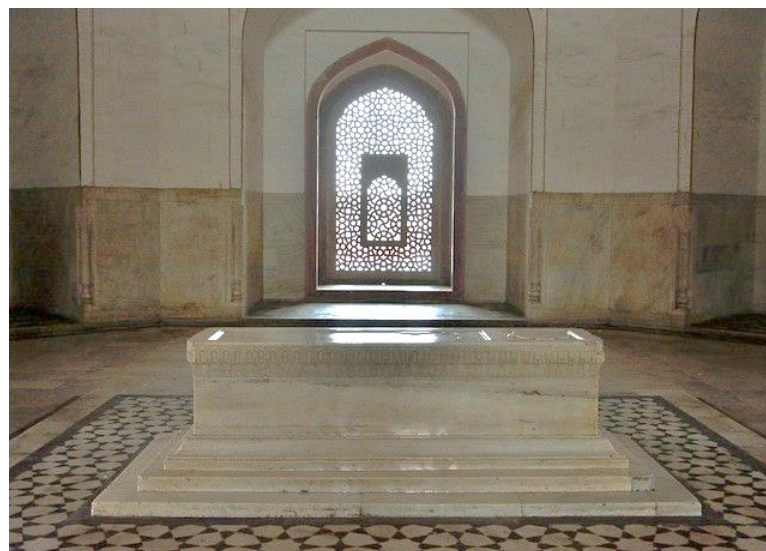


Figure 143: Burial Chamber of the Hāmāyūn 's Tomb Decorated with Floor Tessellation.
 Source: Don't just "click" pictures; Shoot Stories! "Humayun's Tomb on UN Day Oct 24, 2015, New Delhi (7)." Flickr. Yahoo!, October 25, 2015.
<https://www.flickr.com/photos/nileshkorgaokar/21842355603>.

Tomb of Itimād ad Daula was built between 1622-1628 A.D. It is situated on the eastern bank of the Jamna River and in the center of Chārībāgh. In this temple, craftsmen used Decagonal and Quasi-crystalline tiles. They made it possible to create complex geometric patterns having 12-fold rotational symmetry. They used floor tessellation art around the cenotaph in different colours of marble stones.

Mughal emperor Jahāngīr built his father's Akbar tomb 1631 A.D at Sikandarā, Agra, he applied marble inlay and stone tessellation (see Figure 144). The façade of the tomb is beautified with yellow and white marble stone on a red sandstone surface. The spandrels of the main arch are ornated with floral arabesque³³ and *gul-i-nau*, lotus and sunflowers. The square tiles are paved to decorate the floor of the burial chamber inside the tomb. Different colours of marble tiles are used, including black, yellow, brown and white.

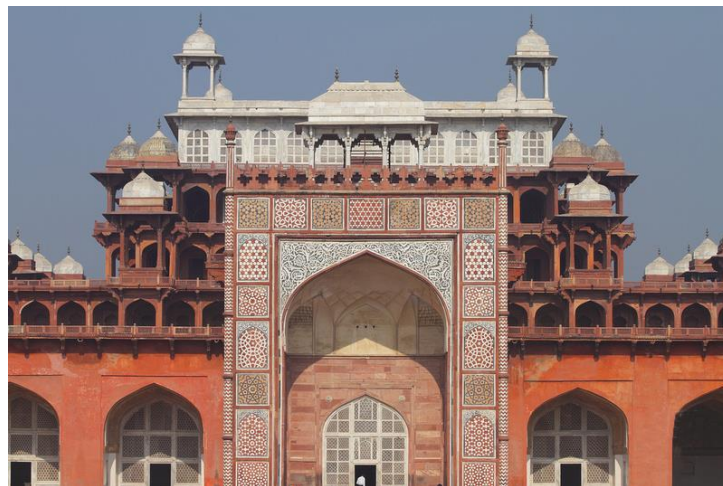


Figure 144: Tomb of Akbar Agra, has the Marble Inlay Work.

Source: "Akbar's Tomb at Sikandra: A Mughal Architectural Masterpiece." Be On The Road | Live your Travel Dream! <https://www.beontheroad.com/2020/08/akbar-tomb-at-sikandra-mughal-architectural-masterpiece.html#>.

The Jahāngīr's Tomb 1637 A.D at Lahore has the well-known marble inlay and stone tessellation (see Figure 145). The Eastern façade is very beautifully ornated with stone mosaic (Koch, Mughal Architecture 1990). The white and yellow marble is used in different sizes to create *gul-i-nau*, chevron, floral vases and floral motifs. A covered stairway on each side of the quadrangle has twenty-five steps on both sides leading to a platform of tessellated floor. Red sandstone and white marble shaped in geometrical patterns paved to create different designs on a rectangular courtyard.

³³ Arabesque is also known as Islīmī Khattatī



Figure 145: Tomb of Jahangir, Lahore with detailed Stone Tessellate Work.
 Source: “Why Is Jahangir's Tomb in Lahore, Pakistan so Famous? - Quora.”
<https://www.quora.com/Why-is-Jahangirs-Tomb-in-Lahore-Pakistan-so-famous>.

The stone tessellation work can be seen in Mughal Gardens located in Wah. The Garden has the water channel inlaid with chevron design in yellow and black marble (Bahadur 1988). Furthermore, floor tessellation can be noticed in the veranda of Shāhjahān’s residency and the pavement of central pavilion situated at upper terrace of Shalimar Gardens Lahore.

Stone Tessellation during Shāhjahān Period

The monuments constructed during the reign of Mughal Emperor Shāhjahān have been ornamentation to the peak. He adopted, developed and introduced new features to its palaces and other buildings. He built Tāj Maḥal, Jāmia Masjid Delhi, Shāhjahān Mosque Thatta, Wāzir Khān mosque Lahore, Shīsh Maḥal Lahore, Moti Masjid Agra, Moti Masjid Delhi, and Rang Maḥal Delhi.

Tāj Maḥal

Tāj Maḥal of Agra is UNESCO World Heritage site and listed in the seven wonders of the world because of its magnificent appearance. Tāj Maḥal complex covers an area of approximately 42 acres, divided into different structures (Falakian and Falakian 2013). It is well ornamented, depicting various motifs and architectural features. The floor and courtyards of the Tāj Maḥal have tessellated work in white marble and red sandstone. It creates two geometrical designs, including 4-pointed star shape and a hexagonal pattern interlaced with 6-pointed star pattern (see Figure 146-147). Symmetrical gardens of the Tāj Maḥal separated by the pathways laid in red sandstone tessellation of square and hexagonal tiles. These tiles are fixed in symmetry and create octagonal patterns at a regular interval.



Figure 146: Tessellation of White Marble in Red Sandstone Creating a Star Shape.
Source: Tourist, Math. "Tilings at the Taj Mahal." Tilings at the Taj Mahal, September 12, 2010.
<http://mathtourist.blogspot.com/2010/09/tilings-at-taj-mahal.html>.



Figure 147: Star Shape Tessellation in White Marble and Red Sandstone.
Source: Tourist, Math. "Tilings at the Taj Mahal." Tilings at the Taj Mahal, September 12, 2010.
<http://mathtourist.blogspot.com/2010/09/tilings-at-taj-mahal.html>.

Wazīr Khān Mosque

Wazīr Khān Mosque located near the Delhi Gate was built in 1634 A.D. Its ornamentation shows the best example of the Mughal era's architectural decorations and its techniques. It has various decorations on the walls, ceilings, domes, and floors with glazed tiles, fresco painting and faux brickwork etc.; Tessellation work is provided to all floors in the mosque, which are built with the bricks, assembled together to form beautiful geometric patterns like square, pentagon (see Figure 148). The third pattern lies in the mid and created with the combination of square and pentagon. These patterns are decorating the floors, especially main courtyard and the prayer chamber of the mosque (Salman n.d.).



Figure 148: Brick floor of Wazir Khan Mosque Lahore.

Royal Mosque Lahore

Another structure built by Emperor Shāhjahān is known as a Royal Mosque or Zenāna Mosque. It is located to the South East of Shīsh Maḥal, and to the south, it has a Sikh period pavilion built by Ranjeet Singh. The floor of the mosque is beautifully decorated with stone tessellation work in geometrical patterns. The roofless structure of the Mosque is totally unrecognizable. Remaining structure has walls and a *Miḥrāb* at the center to the west wall. There are only traces of the tessellation work on the floor level at some places (see Figure 149). The floor decoration of the mosque has pentagon and 8-point star shape patterns. (Lal 1988).



Figure 149: Remains of Royal Mosque built by ShāhJahān has the Traces of Floor Tessellation.

Shāhjahāni Ḥammām

Shāhjahān also built a Ḥammām located in Lahore fort known as Shāhjahāni Ḥammām. It was built during 1633 A.D under the supervision of the viceroy of Punjab, Wazīr Khān (Mumtaz 1989). Ḥammām is situated to the west of Shāhjahān's khawābgāḥ. It is a single-storied building divided in three main chambers. There are

traces of marble tessellation on the floor of a room (see Figure 150). It has simple geometrical patterns in the form of squares and irregular shapes enclosed in a square frame are paved on the floor (Waqar 2019).



Figure 150: Floor Tessellation of Shāhjahāni Hammān at Lahore Fort Decorated in Geometrical Patterns.

Dīwān-i Khāṣ

Dīwān-i Khāṣ is located in Lahore Fort; it was built during 1645 A.D in chaste marble. It was used by Mughal Emporer to receive their royal guests. It is well-decorated structure with different architectural elements. The floor of the structure has the stone tessellation ornated with 8-pointed stars patterns further connected with 4-pointed star to the center, creating irregular polygon shapes. In the courtyard of the Dīwān-i Khāṣ a fountain is located. It is built with white marble and ornated with marble tessellation of 10-pointed star shape (see Figure 151-152). During the British period, this structure was used as a Church (Iftikhar 2019).



Figure 151: Fountain of the Dīwān-e-Khāṣ Decorated 10-pointed Marble Tessellation.



Figure 152: Floor of Dīwān-e-Khāṣ decorated with 8-pointed Marble Tessellation.

Stone Tessellation at Shīsh Maḥal Complex

In Shīsh Maḥal, Lahore Fort, floor is decorated with beautiful stone tessellated work or stone intarsia in the main hall. It is decorated with 10-pointed geometrical shapes in symmetry with a combination of different colours. Its pavements are remarkably finished and among well-known monuments in the entire world. The Courtyard of the pond located in the palace is built in red sandstone carved in cusped shape arches and heart shape at a regular interval. Decoration of the pond's courtyard is in bad condition and has damaged at some points. There is a border decorated with interlaced geometrical patterns enclosing the central decoration. The main courtyard of the palace is tessellated with a square shape tile in the center enclosed by a rectangular bar with an interlaced square in red sandstone (see Figure 153-155). Its interesting point is that the pillar's shafts located in main veranda are twelve-sided; every side of the pillar is separated with a vertical inlaid line. Inside Shīsh Maḥal, a dado of rooms are decorated with zig-zag motifs in stone mosaic technique (Qazi n.d.).

The courtyard of the palace has tessellated work in different designs, including geometrical patterns and floral motifs. Maḥṭābī, located in the center of the courtyard, was reserved for musicians where they used to perform during the full moon night. It has beautiful tessellated work and horizontal cusped arched panels. These panels are tessellated in stone using mosaic technique.

Another portion of palace is cascade locating southern side has a chevron decoration. While a water channel toward inaḥṭābī situated to the south, west and east has the same tessellated work in geometric patterns (*Ibid*).



Figure 153: Platform of Maḥṭābī Decorated in Floral Tessellated Work at Shīsh Maḥal Lahore Fort.



Figure 154: Courtyard Stone Tessellation at Shīsh Maḥal Lahore Fort.



Figure 155: Water Pond Located in the Courtyard of the Shīsh Maḥal Decorated with Geometrical Tessellated Floor.

Naūlakha Pavilion

It is a private chamber built in white marble with a curvilinear roof. It is located inside the Shīsh Maḥal complex to the West. It was constructed by Emperor Shāhjahān between 1628-1634 A.D. Pavilion is built on a rectangular plan with *Do-Chala*³⁴ style curved roof. It is decorated with gilded roof, inlaid work with semi-precious stones, *Pietra-dura* and glazed tiles ornamentations. Floor of the pavilion ornated with different colours of marble tessellation designed in 8-pointed stars interlaced with 4-pointed star in symmetry. These designs are creating an irregular polygon in the center. Craftsmen applied the same technique on the courtyard of pavilion to create marble tessellation. In the courtyard, there is 10-points geometrical patterns design at a regular interval (see Figure 156).



Figure 156: Floor of Naulakha Pavilion decorated with 8 and 4 pointed stars.

Process of Stone Tessellation

The technique of marble tessellation is similar to *Pietra-dura* or stone mosaic. In this process, stone pieces are used instead of semi-precious stones. Each stone piece cut with accuracy to its desired shape. A sharp chisel with the combination of a hammer is used to engrave different motifs. In this whole process, proper attention and care is important for its exact adjustment to fill the cavities. After completing the process, the tessellated stones are rubbed with emery powder, and different kind of adhesive materials are used to fix the inlaid stone. Then the surface is rubbed with tools to remove any irregularity. (Qazi n.d.)

³⁴ The *do-chala* type has only two hanging roof tips on each side of a roof divided in the middle by a ridgeline

After chiseling the stone, the final step is to remove the irregularity and make a proper shape. Mughal craftsmen used a stone tool to rub it on the surface of stone. It was a simple technique for making the stone element smooth with a delicacy (Haq 2020).

Mughal architects used this technique and craft for the special type of flooring known as tessellated floor. In this craft, different colours of marble are laid and fixed in floral and geometrical formations, separating each other by the lining of black marble (*Sang-e-Mūsa*). There are three more colours of marble used, including white (*Sang-e-Marmar*), shaded marble (*Sang-e-Bādal*), variegated stone (*Sang-e-Abri*) and yellow marble (*Sang-e- Khattū*).



Figure 157: An Artisan is fixing the Floor Tessellation marble.
Source: Archeology Department of Punjab.



Figure 158: An Artisan using the Traditional Chisel and a Hammer on the Surface of Tessellated Floor.
Source: Archeology Department of Punjab.

In modern time stone cutting tools are available in the market, designed by many industries with different types of material compositions. Mostly 90% cobalt is used as a binder material with 4% bronze and 2-3% diamond particles in stone cutting tools. This composition depends upon the stone hardness which is to be cut.

There is different process for marble cutting, starts from huge block to small size tiles. A variety of tools are used for all the process to get a final shape. The cutting process affects the efficiency of polishing and grinding processes. If a marble is not well cut, then extra time will be required in the polishing process. In some cases, there is no other way to recover the damages. Quality of cutting tools matters, a sharp cutting edge and long-lasting tools are preferred for precise cutting. A few tools used in the process are;

Diamond tools

There are a large number of diamond tools used in the cutting process. All are available in different qualities because each stone has its own abrasive properties and hardness. The Diamond cutting tools are PCD (Procrystalline diamond tools), SPDT (Single point diamond cutting tools), Diamond saw blades, Diamond tipped grinding cups, Diamond tipped hole saw, polishing pads, diamond wire cutting, Diamond saw chain etc.

Laser Cutter

In this modern machine, a lesser beam is used to slice different materials. There are three types of lasers used in cutting process. The CO₂ laser is designed for engraving and boring a solid material. Neodymium yttrium aluminium garnet (Nd: YAG) and neodymium (Nd) these lesser tools have different applications. Nd is only used for boring a material while Nd: YAG laser is efficient in engraving and boring.

Grinder Cutter

This tool is widely used in marble cutting along with other host tools. This machine performs different grinding operations, and it needs a highly skilled operator. These cutters have a variety of tools, including Radius grinder, D-bit grinder, and CNC (Computer numerical control) cutter.

Water Jet Cutter

It is an industrial tool used for cutting different solid materials, including stones. It works with a high-pressure jet of water mixed with an abrasive substance. It is also known as an abrasive jet.

Polishing Tool

This is a powered tool used for polishing the surface of dull stone. A grinding disc is attached under the spindle through a belt. The grinding disc rotates at high speed and helps to polish the surface of stone.

Adhesive

Adhesives are the same, which are mostly used in mirror mosaic or any other architectural decoration.



Diamond cutting Tool



Grinder Tool



Lasser Cutting Machine



Marble Polisher

Figure 159: A Set of Modern Tools.

Analysis

The building activities were started by Turks who came from Afghanistan to the subcontinent in 12 Century A.D. It was the beginning of art and architecture across the subcontinent and exhibited in the construction of palaces, mosques and tombs. Initially, they practiced marble inlay work decoration using different patrons,

including *gul-e-nau*, chevron design, linear work, star shape designs, cusped shape designs, sunflower and lotus designs. Adopting the technique of stone mosaic work or inlay work, Mughals used this technique to create floor tessellation designs. They created different geometric patterns to decorate the floors of palaces, tombs and mosques. It was the new addition to the Mughal architectural art and craft. They used chisels and a hammer to shape the marble pieces into desired geometrical patterns. At the final stage, to remove irregularities and roughness of a stone, another stone was used to rub the surface of the carved stone.

There are different tools used in modern time for many purposes. All of the tools are powered and efficient in the whole process. In the cutting tools, a variety of diamond cutters are designed according to the nature of stone. These tools are able to cut any type of stone material. Apart from the diamond cutter, another revolution in the modern world is laser cutters. This type of cutter works on the principle of lesser beam; it is helpful to shape a stone into any pattern. It is a computer-based cutting system work on the given command by the operator. In this process, water Jet system is also used to cut a stone with interacting the whole area of a stone. It is used with a combination of water and abrasive for hard material. At the end of the whole process, polishing tools are used after the installation of stone into the surface. These tools have high speed rotating grinding disc, which removes the irregularities and roughness of the surface.

Modern tools are applied with the combination of traditional tools. Traditional tools are only used by the craftsman working on small-scale carving. A variety of chisels like flat toothed, pointed are used along with a hammer. In some cases, grinder cutter tool is used for cutting or shaping the stone slab. These tools are simple and easily available, while modern machinery can only be utilized in industrial practices.

Chapter VIII

Stone Inlay (Khatam-sāzī)

Historical Background

Inlay work is a visual art used to decorate buildings, wood and metal. It is a traditional art which is created with precious and semi-precious stones in the form of floral and geometric patterns. Marble inlay work has not an exact origin so far; it is a general argument that inlay work belongs to the Italian. It has the resemblance to the *Pietra-dura*, which was started in 16th Century A.D in Italy. It was performed as decorative panels, floral and bird motifs. In Byzantine, inlay art was used to decorate floors and religious figures. Indian artisans adapted this art to ornate the Mughal era building and applied this technique to depict Indian motifs. Some believe that the inlay art developed in India and can be noticed in the building of Akbar, Jahāngīr and Shāhjahān. There is continuous development in inlay work from Jahāngīrī Maḥal to Akbar's Tomb as well as Tomb of Salīm Chīshṭī and Itmād ud Daula. The tomb of Itmād ud Daulah links two different phases of the Shāhjahān and Akbar Period. The tomb is well decorated with inlay art on white marble. It shows the transition from Akbar's period where he used red sandstone with direct simplicity and strength of structural design to that of the lavish marble with all the changes (Sarkar 1953).

The early example of inlay in India is the Chaumukhī Jain Temple built in 1438 A.D at Rānpūr. Mughal monuments, which were built by different emperors, are decorated with inlay art. This art is developed form of mosaic art and further classified into two styles. In the first style of the inlay art different colours and shapes of stone were used to create a pattern on the surface of plaster or a stone slab. In the second style, semi-precious stones were used in sandstone or marble (Nath 1970). The first type of style can be noticed in the form of geometrical patterns in Bulānd Darwāza at Fatehpūr Sīkrī, Jahāngīr Maḥal at Red Fort and Akbar's tomb at Sikandarā. The second type is used in the tomb of Itmād ud Duala, Salīm Chīshṭī and exterior of Tāj Maḥal. The Kilḥa-i Kuhna mosque in the old fort at Delhi, Tomb of Humāyūn in Delhi has the same inlay art (Smith 1898). The buildings built by Emperor Akbar, like Delhi Gate of Agra Fort, Jāmī Masjid, façade of Jahāngīrī Maḥal, Bulānd Darwāza Fatehpūr Sīkrī are decorated with the same style. During the

period of Jahāngīr, this art is applied in a fine manner at the tomb of Akbar, Itmād ud Daula and Salīm Chīshī, at its perfection (Smtih 1901).

Inlay work art on semi-precious stones began in Florence, Italy, at the end of 16th Century A.D. Inlay art is of Italian origin with European influences (Koch 2001). Mughal Inlay art is a developed form of Indian art, and this type of art is paved on any solid surface. The Mughal Inlay art originally belonging to India, and the earliest example of the Inlay can be noticed at Chaumukhī Jain Temple, built in 1438 A.D at Rānākpūr.

Stone Inlay During Mughal Period

Tomb of Itmād ud Daula



Figure 160: General view of the tomb of Itimād ud Daula.

Source: “50 Places to Visit in India, Top Attractions & Best Tourist Places in”
<https://www.hoteldekh.com/attractions/itmād-ud-daulahs-tomb>.

Tomb of Itmād ud Daula is the finest and delicate example of Mughal architecture. It is the resting place of Mughal courtier Mīrza Ghiyāth Baig and Asmat Begum. It was built by his daughter Nūrjahān. Tomb is built on a square plane in a white marble about 65’ long and set on the plinth. Structure of the tomb is built of marble decorated interiorly and exteriorly with stone inlay work (see Figure 160-161). The ornamentation of the architecture includes precious and semi-precious stones along with different motifs such as creeper, wine glasses, cypresses and a variety of geometrical arabesque designs. It shows a connection between the decorative style of Akbar and Shāhjahān (Agnihotri 1982-83).

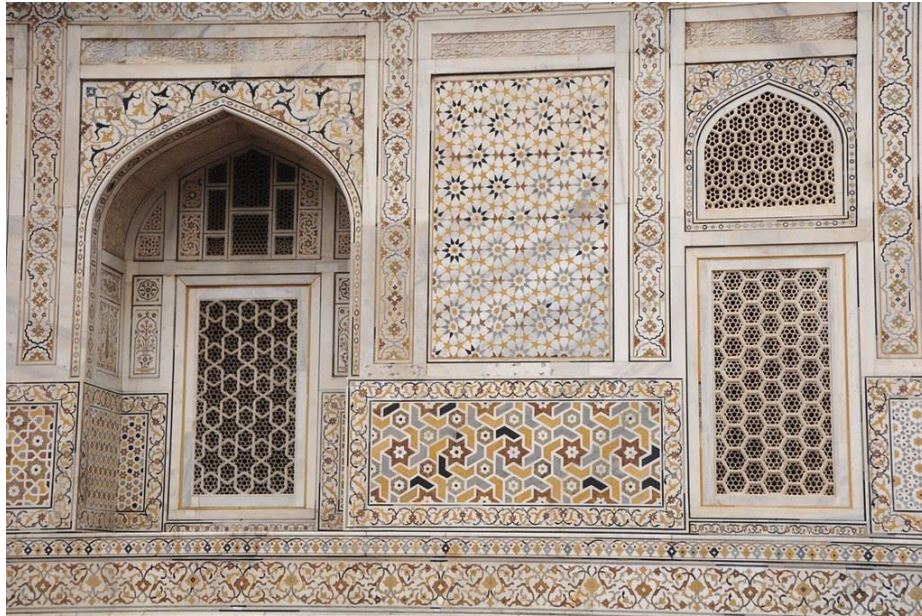


Figure 161: Detail of Inlay work at the tomb of Itimād ud Daula.

Source: Platongkoh. "Facade of 'Baby Taj' Mausoleum in Agra - a Draft of the Famous Taj..." iStock <https://www.istockphoto.com/photo/facade-of-baby-taj-mausoleum-in-agra-a-draft-of-the-famous-taj-mahal-gm926721662-254269542>.

Buland Darwāza

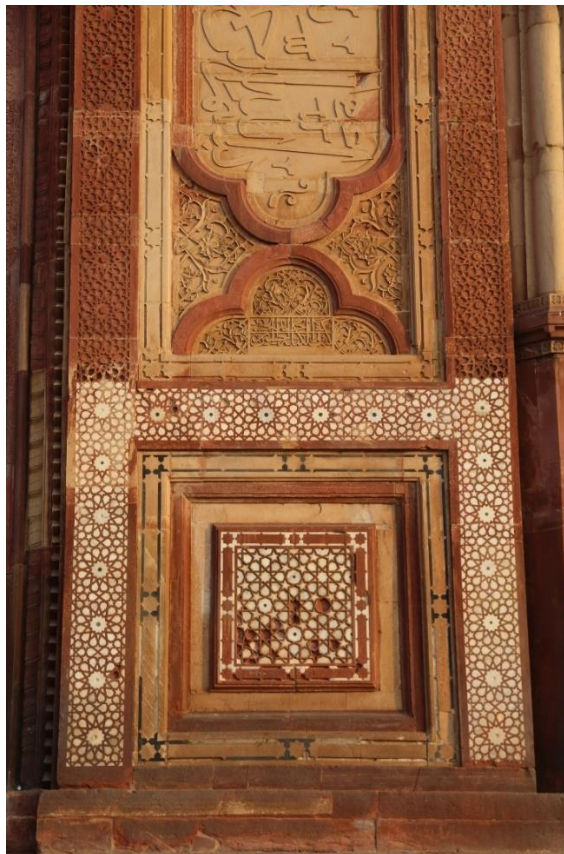


Figure 162: A General View of Buland Darwaza Showing the Decorative Inlaid Elements.

Source: Limited, Alamy. "Fatehpur Sikri, India. Geometric, Floral, and Calligraphy Decorations Embellish a Portal of the Great Gate of the Jama Masjid Stock Photo." Alamy. <https://www.alamy.com/stock-photo-fatehpur-sikri-india-geometric-floral-and-calligraphy-decorations-47954749.html>.

Buland Darwāza at Fatehpūr Sīkrī is built in red sandstone, architectural ornamentation of the structure is done in white and black marble. It is a symmetrical structure, topped by kiosks. Spandrels of the gate are framed with inlaid white marble and a rosette design at the center of the narrow panel (see Figure 167). The Interior of the gate is inlaid with white marble designed in Arabesque and geometrical patterns (Koch 2001).

Jahāngīrī Maḥal



Figure 163: Western Facade of the Jahangir Maḥal Decorated with Geometrical Inlay Work.

Source: “Golden Triangle – Delhi / Agra / Jaipur 5 Nights / 6 Days.” Dadabhai Travel.

<https://www.dadabhaitravel.in/tour/golden-triangle-delhi-agra-jaipur-5-nights-6-days/#lg=1&slide=1>.

Jahāngīrī Maḥal 1565-1569 A.D is located in Agra Fort India and its construction was started by Mughal emperor Akbar but who did not took his credit. It is the earliest building of Akbar’s period, which is still surviving. It was used by Empress Nūrjahān as her personal residence. The building consists of rooms, verandas and other structures surrounding the courtyard. The western façade of the palace is well ornated with white marble inlay on the surface of red sandstone (see Figure 163). Artisans used rectangular and cusped shape decoration to the façade. (*ibid*)

Tomb of Salīm Chīshṭī

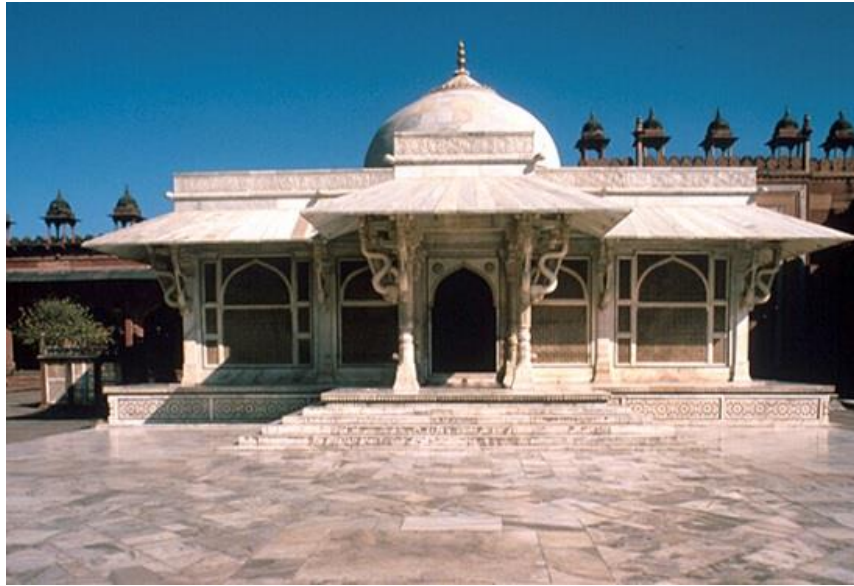


Figure 164: Tomb of Salīm Chīshṭī Fatehpūr Sīkrī.

Source: “HTTPS for WordPress.” WordPress.org Forums, <https://wordpress.org/support/article/https-for-wordpress/>.

The Tomb of Salīm at Fatehpūr Sīkrī was built by Akbar to commemorate the holy man. It is built on a square plan in the courtyard of the Fatehpūr Sīkrī complex along with other structures. The structure is single storey with a flat roof along with a semi-round dome placed at the center of the roof. The upper part of the semi-circular dome is encircled with horizontal rim from tiny lotus leaves. All of the structure is built in white marble, and the walls of the tomb are decorated with geometric patterns of inlay work in white and yellow marble (Natalia, et al. n.d.).

Qila-i-Kunha Masjid

A historic Mosque Known as Qila-i-Kunha Masjid or Sher Mandal is located in a Sher Shāh Sūrī Fort or Purana Qila, Delhi. It is a debate about the actual founder of the mosque. Some scholars agree with Emperor Hāmāyūn as a founder. It is a five-bay mosque, and extreme end bays were added later. Mihrāb of the mosque is not as structural as the arches of the eastern façade. There is a unified concept in the ornamentation of the mosque. The motifs on the column’s base, frieze and capitals have consistency in the interior of the mosque. The Interior and exterior of the mosque around the mihrab is decorated with white and black marble inlay work in geometrical patterns (see Figure 165-166) (Jain 2008).

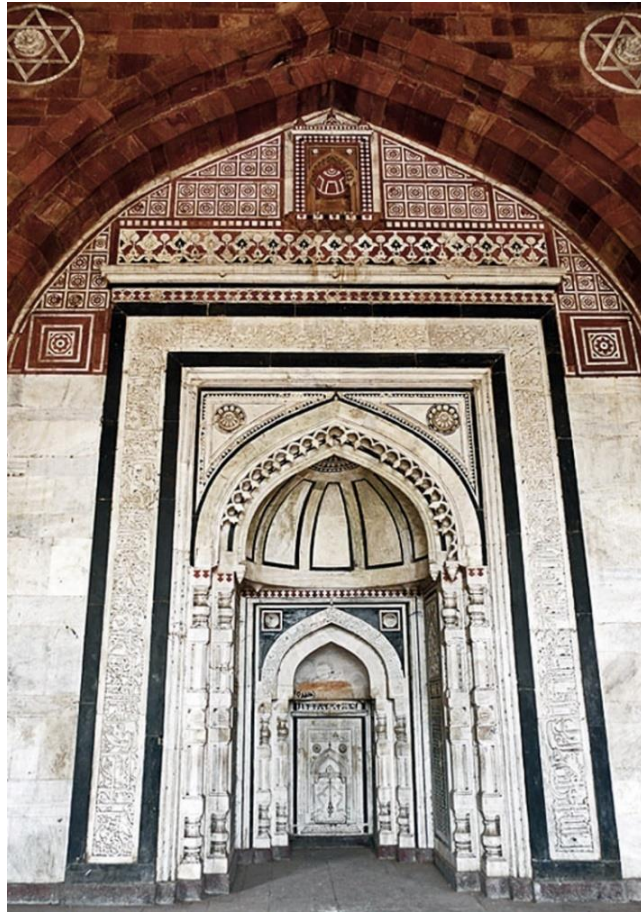


Figure 165: Mihrab of the Mosque is Ornated with Inlay Geometric Patterns.

Source: "Delhi." TrekEarth.

<https://www.trekearth.com/gallery/Asia/India/North/Delhi/Delhi/photo1205505.htm>.



Figure 166: Facade of the Mosque has the same ornamentations.

Source: Editor|, Samonway Duttagupta|Samonway Duttagupta|Times Travel. "Delhi's Purana Qila Excavation Work Reveals Links to the Iron Age." Times of India Travel, January 27, 2018.

<https://timesofindia.indiatimes.com/travel/destinations/delhis-purana-qila-excavation-work-reveals-links-to-the-iron-age/gs62669159.cms>.

Tomb of Humāyūn

Tomb of Humāyūn is a massive structure built in red sandstone and white marble on a large plinth having fifty-six cells more than a hundred gravestones in the centre of a garden. The mausoleum was designed by Mīrak Mīrza Ghiyāth Baig, who was a Persian architect. The most important feature of the mausoleum is its size, symmetrical plan rubble core in red sandstone, as well as white marble and garden. The façade and the interior of the mausoleum are decorated with stone inlay work in detail. Artisans paved the floral and geometrical motifs of white marble in red sandstone (Lowry 1987).



Figure 167: Hāmāyūn tomb decorated with inlay work.

Source: “WP-Content: A Beginner's Guide to Wordpress' Most Important Directory.” Malcare, <https://www.malcare.com/blog/wp-content-uploads/>.

Tomb of Akbar

Jahāngīr era was the transitional phase in the decoration of building. He replaced the red sandstone and used white marble. Architectural trends during his reign have a noteworthy structure, including the Tomb of Akbar. The beautification of the Akbar’s tomb is done with the combination of red sandstone and white marble. The walls are ornated with geometric patterns and arabesque designs which were followed during his reign; abri stars are inlaid in geometrical oblong dado panels as well as arrangements of rectangular and square pieces of multihued stone in different floral patterns. There are only three marble dados on the second storey hall to the western gateway are a fine example of dado art decorated in hāshiya³⁵, beautiful inlaid

³⁵ It is the Urdu/Persian term used for Boarder lines.

borders in white marble (see Figure 168). All the floral and geometric decorations are highlighted by a black marble on the surface of red sandstone (Jamil and Gulzar 2017).



Figure 168: A detail of Akbar's Tomb at Sikandara decorated with Stone Inlay.

Source: Kabanova, Ragne. "Ornate Facade of Akbar s Tomb. Agra, India Stock Image - Image of Inlaid, Ethnic: 11221575." Dreamstime. <https://www.dreamstime.com/royalty-free-stock-photo-ornate-facade-akbar-s-tomb-agra-india-image11221575>.

Bādshāhī Mosque

Bādshāhī Mosque was built by Emperor Aurangzīb in 1671-1673 A.D at Lahore. It is situated to the west of Lahore Fort and considered to be the iconic landmark of Lahore. Façade of the mosque is built in red sandstone and decorated with white marble inlay. These marble inlays are geometric and floral designs. Entrance to the main hall of the mosque has a series of cusped shape inlaid arches in black marble enclosed in square and rectangular frames. Both exterior and interior of the mosque are ornated with inlaid white marble depicting floral and geometric designs (see Figure 169-170). (Joseph 2005).

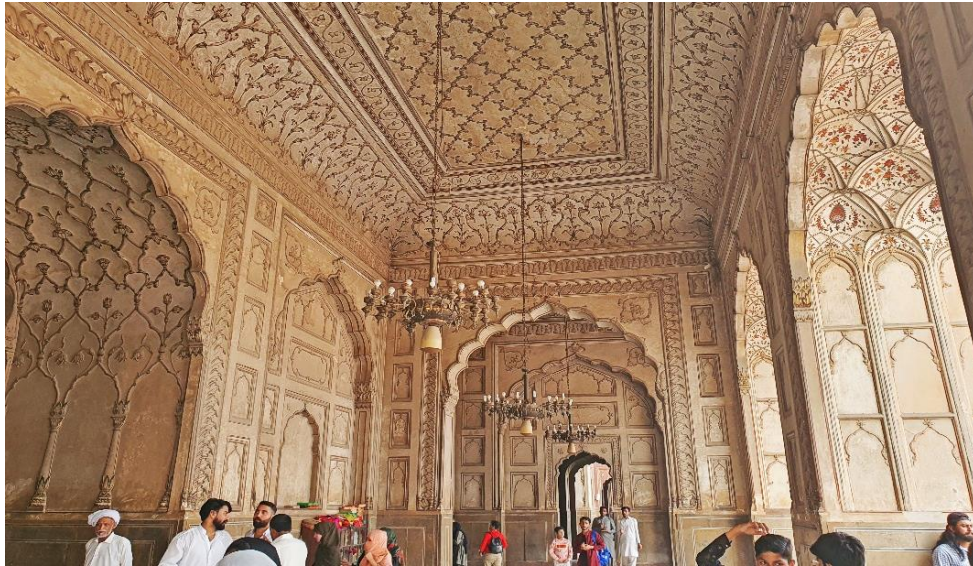


Figure 169: Interior of Bādshāhī Mosque Lahore



Figure 170: Facade of Bādshāhī Mosque Lahore.

Mumtāz Maḥal

In the Red Fort, Delhi, the largest building of the enclosure is Mumtāz Maḥal or Rang Maḥal. The ceiling of the mansion is bright colour and inlaid with gold (Blake 1991). A Canal which is known as Naḥr-i-Bihisht was built over the Yamuna River for the water supply to the fort. It runs through the Rang Maḥal and has a large lotus shape pond in the center. The borders of the ponds are decorated with floral inlay and precious stones (see Figure 171).



Figure 171: Lotus Shape Water Pond Rang Maḥal, Agra Fort.

Source: Limited, Alamy. “North India Delhi Local Caption Red Fort Old Delhi Marble Fountain Stock Photo.” Alamy. <https://www.alamy.com/north-india-delhi-local-caption-red-fort-old-delhi-marble-fountain-image9927723.html>.

Dīwān-i Khāṣ

Dīwān-i khāṣ is also located in the Red Fort Delhi built by Shāhjahān in 1648 A.D. The building was served as a special hall for the state guest and also known as a Shāh Maḥal. It has a rectangular central chamber enclosed in a series of arches. Its rising marble piers are inlaid with floral designs (see Figure 172). The ceiling of the hall was originally decorated with inlaid silver and gold (John 1911).



Figure 172: Interior of Dīwān-i khāṣ Red fort Delhi.

Source: “Delhi India 15022018 Beautifully Decorated Arches Stock Photo 1026694060.” Shutterstock. <https://www.shutterstock.com/image-photo/delhi-india-1502-beautifully-decorated-arches-1026694060>.

Motī Masjid

Motī Masjid or Pearl Mosque is located inside the Red Fort complex India. It was constructed in 1659-1660 A.D for the second wife Nawab Bai of Emperor Shāhjahān. The main hall of the mosque is two aisles deep with three arches. The dome of the mosque is bulbous and gilded with copper. The courtyard of the mosque is built in white marble and inlaid with Mūsalla design in black marble. (Ibid). Moti Masjid Lahore has the same inlaid cusped arch pattern creating a Mūsalla design in black marble on white marble flooring (see Figure 173-174) (Qazi n.d.).



Figure 173: Courtyard of Moti Masjid Red Fort Delhi.

Source: projects, Contributors to Wikimedia. Wikimedia Commons. Wikimedia Foundation, Inc., https://commons.wikimedia.org/wiki/Main_Page.

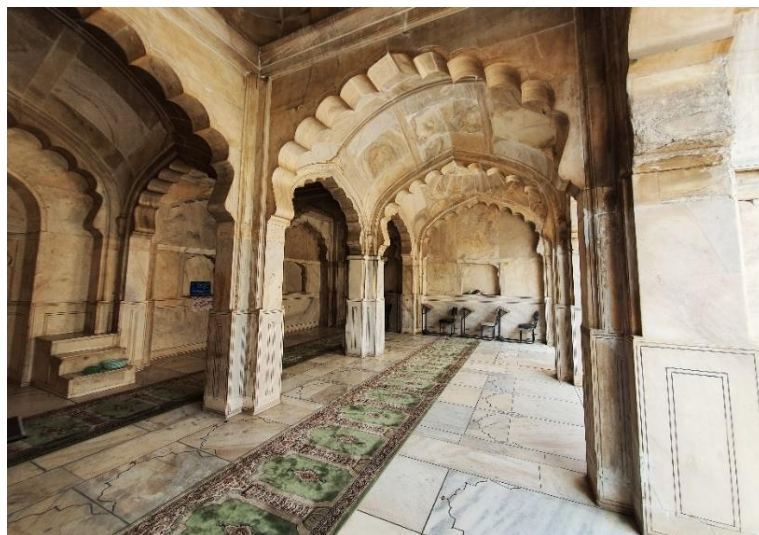


Figure 174: Floor decoration of Moti Masjid Lahore.

Masjid-i-Jahānnūma

Shāhjahān built a Mosque in 1636 A.D and named it Masjid-i-Jahānnūma or World Displaying Mosque. The interior of the mosque is similar to the Jami Masjid Agra. At the time of its construction, it was considered to be the largest Mosque of that time. Façade of the mosque was built in red sandstone and inlaid in white marble geometric designs. The Prayer chamber is built in red sandstone and decorated with inlaid white marble floral designs and multiple cusped arches. Above the entrance to the prayer chamber, it has marble panels inlaid with black stone Persian inscription which was written by Nūr Allah Ahmad (see Figure 175-176). (B. Asher 1992).



Figure 175: Facade of Masjid-e-Jahānnūma Delhi inlaid in White Marble.

Source: Cleary, Ellie. "Delhi Archives." Soul Travel India, <https://soultravelindia.com/category/delhi/>.

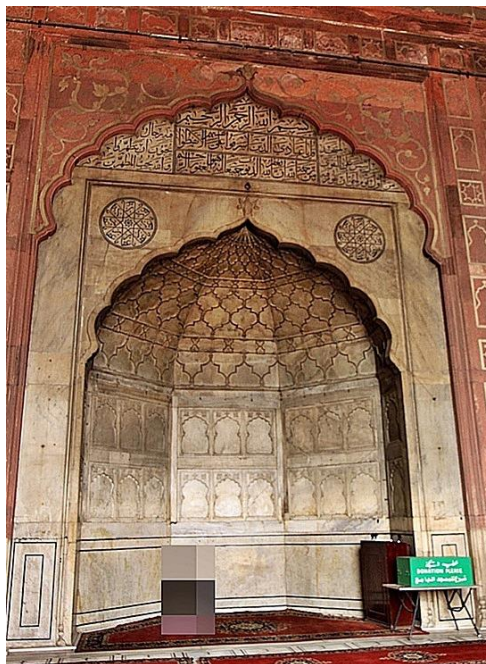


Figure 176: Prayer Chamber of Masjid-e-Jahānnūma Delhi.

Source: Caswell, Kathy. "Mosques, Monuments, Tombs – Delhi Has It All." The Happy Snapper, July 26, 2020. <https://thehappysnapper.org/mosques-monuments-tombs-delhi-has-it-all/>.

Shalīmār Gardens Lahore

‘Alī Mardān Khān conceived a project of Shalīmār Gardens Lahore in 1641 A.D and Shāhjahān allowed him to construct. It was launched under the supervision of Khalīlullah Khān. It was the finest achievement of Emperor Shāhjahān after the construction of Tāj Maḥal. In the opinion of many historians, it is one of the elegant achievements of Mughal architecture at its peak (Nath 1982). It measures 2160’ north-south and 935’ east-west. It has five cascades along with great marble cascade and Sāwan Bhadūn. The main building of the Garden is located in the premises that include Sāwan Bhadūn, Naqār Khāna, Khawābgah of Begam Sahib Bāradarīes surrounded by fountains. The two huge minarets and gateways in the corners are called Dīwān-i Khās-o ‘Āam (Kausar 2005). Shalīmār Garden is a combination of all architectural elements of the Mughal Era.

A court historian Abdul Hamid quoted that the Chīnī Khānās present in the central open pavilion were removed after two decades of the construction. It was the major alteration done in the Shalīmār Gardens. New floor constructed along with the water chute carved in white marble with black marble inlay (Mubin, Gilani and Hasan 2013).

Stone Inlay at Shīsh Maḥal Complex Lahore Fort

There are a variety of decorative architectural elements in the palace, has a key role in the beautification of Shīsh Maḥal. Several inlaid elements are used to decorate the interior of the building. Inlay art on the surface of marble was started during the region of Mughal Emperor Shāhjahān. The palaces are the most perfect and redefined stage and continuous spectacles in the field of Mughal Inlay Art. This art appears in the form of decorative panels with geometric and floral motifs suitable for floor level and walls decorations.



Figure 177: Multicolored stone inlay at Shīsh Maḥal Lahore Fort.

The Indian inlay art is not three dimensional, but it has a flat surface and is different in appearance and techniques as compared to the *Pietra-dura*. The Interior of Shīsh Maḥal has inlaid motifs decorating the various part of the glassy monument. These motifs are engraved and inlaid in black, yellow and red colour stone (see Figure 177). A rectangular panel on the surface of the wall at dado level is inlaid in four multi-coloured different geometrical patterns, inside black boarded inlaid in a double rectangle. The same panel is provided on the upper side of the lattice screen installed in the palace and external balcony. The lower border of the walls is also inlaid with straight and flipped Chinese cloud-collar³⁶ and floral motifs, bordered in a black inlaid line. Throughout the palace, same colour scheme is applied for the inlaid art to maintain symmetry (see Figure 178).



Figure 178: Interior of the Shīsh Maḥal ornated with Inlay Work.

The decorative scheme of the Naūlakḥa Pavilion differs from the Shīsh Maḥal, as there is the addition of floral inlaid motifs. The external wall of the pavilion is decorated with a vase motif inside, and on each side of the vase, two plants are depicted with red colour flower plants in a square frame. The projected rectangles are provided on both sides. The lower portion of the wall has different repeating floral motif in a square frame. A yellow colour square is inlaid inside the border of the floral design. A folded panel installed inside the pavilion has the floral motifs boarded with black inlaid rectangular frame. Under the Dasa level, two types of patterns are used. Lower designs have the combination of geometric and floral design while the upper border is ornated with Chinese cloud-collar motif and floral design. These borders

³⁶ Chinese cloud-collar a four-lobed pattern of considerable antiquity, the name apparently arose during Middle Ages.

have rectangular frames covering at the interval. Above these borders, square frames are provided along with repeating floral motifs. The exterior of the pavilion is inlaid in different geometrical and floral motifs. The topmost of the pavilion has a long border of the Chinese cloud-collar motif. The main cusped archway of the pavilion is bordered inlaid in black stone. There is a symmetrical motif on each side of the cusped arch in different geometric patterns, including squares, rectangles etc. A single cusped arch with a knob is inlaid on the left side of the main entrance, and a fully decorated plant with flowers, under a cusped arch with a knob bordered in a rectangle. On the right side, the first floral motifs are enclosed in a square frame, while the second inlaid decoration is composed of a plant with flowers under a cusped arch in the rectangular frame. There is some similarity between the decoration on the left side but the only difference is that it is one side above the cusped arch that has floral decoration while other side is blank. The floor level of the pavilion is also inlaid decoration in the form of geometrical patterns in certain bends and curves.

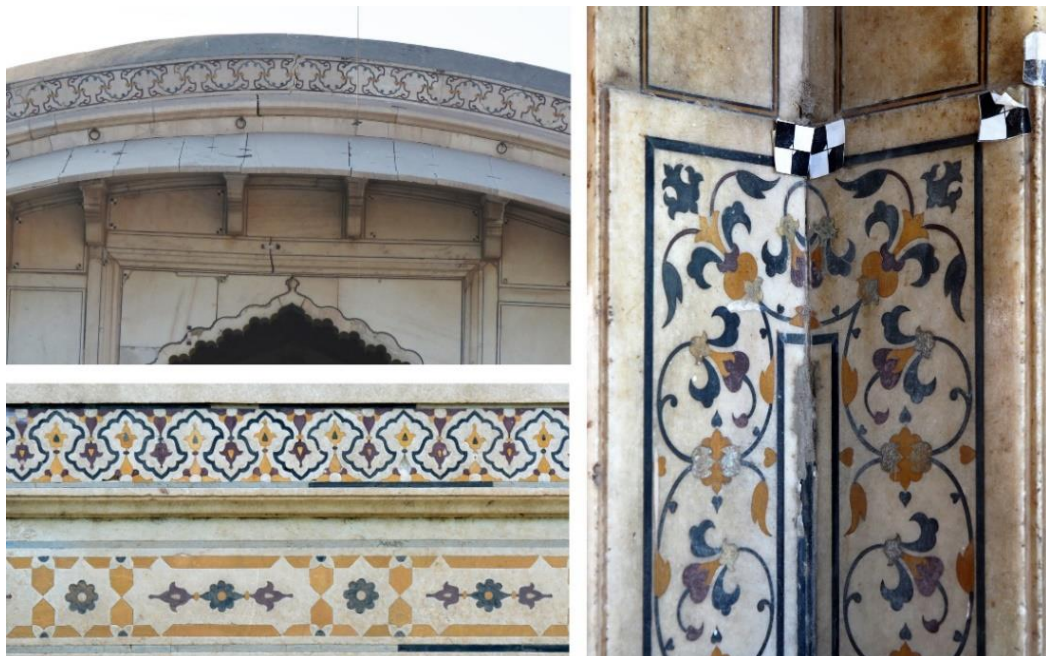


Figure 179: Inlaid decoration of Naulakha Pavilion.

Process of Stone Inlay

The art of stone inlay work is a complex and delicate process that needs special expertise. The stone inlay is the pavement of fine cut stone motifs and glued one by one on the surface of marble and red sandstone or wood. Initially in the first step of the process involves in hand cutting and shaping of the stone in different motifs as we discussed in the previous chapter of stone tessellation. In the second step, different geometrical and floral patterns marked on the surface of the stone by

following the drawings with the help of charcoal. The next step is the engraving which is the main process in the inlay work that marked motifs chiselled away to create a deep cut inside the stone. After the chiselling, the created shapes must fit into these cuts individually and accurately, filling the gaps. Once all the elements get fit on the surface of a stone then a layer of grout is applied before permanent pavement of the motifs.



Figure 180: Artisan working on red Sandstone.

In the Mughal era, the glue was prepared from bee's wax, honey, sugar cane, lemon juice, lentils and marble dust. A shard of grindstone is used to smooth the surface after the insertion of the inlay stone. This step includes the removal of extra layer of the adhesives during the process of rubbing grindstone. In the final step, the stones are now properly fixed into the panel of stone, and a layer of wax is applied. The whole process depends on the craftsman skills, the more accurate and detailed work of ornamentation he creates.



Figure 181: Traditional Process of Inlay Work.

In modern days, the craftsman planned and create the inlay work according to the desired specifications with the help of the latest and traditional tools. In the modern process, the entire work is divided into the symmetrical section with the help of geometric tools and creating a sketch of designs on a 1:1 scale. The entire drawing containing the ornamental motifs traced on a sheet of brass and cut out precisely by a skilled person to create a single template of each design. This phase is the most important, where the selection of the material is made for motifs. The execution of whole plan is done by a team of most skilled artists, each is responsible for completing only one phase of the process. This phase begins with the shaping of the selected material with *Sān* and *Kamānī*. These artists reveal extraordinary precision in alteration of these stones in delicate geometric or floral motifs. The phase of creating the entire design on the surface of the stone can be short or long term, up to several years, depending on the complexity of the decorative motifs.

Therefore; the following natural stones are used in the process of inlay work are;

Turquoise: Turquoise is a natural gemstone and chemically composed of hydrous copper aluminium phosphate. Its blue colour is the presence of copper and green colour from iron. It is the oldest gemstone used by many civilizations, and the finest quality is found in Persia and Egypt. So, its shinny blue colour has a trend in different ornamentations.

Coral: This is the organic stone that was founds on rocky seabed's. Basically, it is found in Italy and Japan. The composition of the stone is calcium carbonate and magnesium carbonate as well as some organic matter and a bit iron. It has a variety of colours used in decorations.

Cornelian: It belongs to the mineral family of quartz. It is found abundantly in India. The colours are orange, red, and deep orange are popular in art and craft.

Amethyst: This type of stone is composed of silica and belongs to the quartz family. It has purple colour because of manganese. It is used for different decorative purposes.

Jade: The use of this stone is dating back to 7000 years. It is tough in nature and has the composition of Jadeite and nephrite. It is green in colour and has a greasy shine.

Tiger's Eye: The composition of this stone is silicon dioxide. It has shinny black colour caused by iron and golden and yellow strips by oxide staining.

Onyx: It remained popular in Greeks and Romans in ancient times, and its name is derived from onyx (Greek word) that mean Fingernail. It is translucent in nature and has different colours, from exotic honey to green.

Agate: It is translucent in nature and cloudy in appearance with different shapes and forms.

The accomplishing of the carved surface is moved to the next phases where another artisan is specialized for fixing of decorative motif into the stone. This stage starts with the arrangement of floral geometric motifs placing on the surface of marble, and marked the positions by an artisan. The outline for these motifs is created with the help of a lead. The stone motifs are then removed and kept on the side in proper order. A handheld chisel is used to carve the marble with care to make grooves according to the motifs. Good accuracy in this process is required that there is no gap between the edge of marble and inlaid stone. Glue is used to fix permanently carved motifs into the grooves. Finally, the finished panel of the inlay work is polished by the specialists with a mixture of polish compound.



Figure 182: Process of Marble Inlay Work.

Source: M K Handicrafts. "Taj Mahal and Its Marble Inlay Art." Marble Inlay Handicrafts Agra. M K Handicrafts. <https://www.artefactindia.com/Taj-Mahal-and-its-marble-inlay-art>.

Analysis

The sequence of processes that culminates in the realization of a masterpiece of marble inlay was perfected by the Mughal artisans in the 17th century and has remained largely unchanged for over 400 years. Although the craftsmen still makes

use of tools & techniques from the Mughal era, but the precision in workmanship that master artisans achieve with their superb skills cannot be replicated by most modern-day machines. However, there are minor modifications in the techniques of stone inlay work. The adhesive material of the modern time has different composition as it was in the past. Various glues and grouts are available depending on the nature of work with different strengths and setting time.

The tools used in the process of inlay work are still same, but a number of modern machinery is available. This machinery can be utilized for the inlay decorations to save time as well as to give perfection. Modern laser system is one of the most reliable tools used in different industries. It has less chance of mistakes because it is operated with a computer-based system. A design is uploaded to the computer, and it works the same as the design is provided. Apart from this machine, dentistry powered tools are effective in drilling, buffing and cutting. These are small and powerful tools that can be helpful in modern inlay decorations.

Chapter IX

Pietra-dura (Parchīnkārī)

Historical Background

The *Pietra-dura* is an Italian word that means hardstone. It is sometime referred as *Pietra-dura* or Hardstones and also known as Florentine mosaic. It is a technique of inlaying precious and semi-precious stones on a hard surface. This technique is known as a Parchīnkārī in Indian Subcontinent. The Origin of the *Pietra-dura* remained debatable, and most of the European writers claimed it has a European origin with all essential ingredients of Islamic orientation. They tried to find the non-Indian elements in this unique form of ornamentation in Mughal period monuments.

The Emergence of Islam contributed to the world in art and craft. The fusion of different cultures under Islam results the development of extraordinary decorative art. This is a fact that Muslims adopted many traditions of art from the pre-Islamic era, but these arts developed more than they received from the Muslims (Jones 1910).

As per definitions, It was practiced during the 16th-18th centuries A.D on the tables tops, rooms and church ornamentations in Florence, Italy. These stones are cut and fitted into the surface, forming geometrical and floral patterns as well as pictorial designs and polished surface (Reed n.d.). A similar art was practiced in Byzantine as gold and silver, precious inlaid stones and enamelled was set in a manner to attain perfection.

The techniques of *Pietra-dura* were widely used in early dynasties that allowed rich effects in many colours and textures. It is also practiced in Greece using carnelian, chalcedony, and jasper. This material was introduced from east and a cutting wheel which was compatible with cutting hard stone used since bronze age. In Egyptian civilization, seals were most common with a carved beetle on the back, small stone set in a pendant or on a swivel as a ring. But it seems like the work of ancient Greeks or some other area where the Phoenicians art were to be found (Boardman 1964).

In Ancient Rome, seals for personal adornment and small decorative objects were developed since very early time. The technique of working highly developed in Rome and revived in Florence and Milan, Italy. Italian craftsmen manufactured large

vases, bowls, ever etc. which were carved out with precious and semi-precious stones and set in showy gold and enamel mount (Burn 1987). Occasionally statues were made and decorated in different types of *Pietra-dura* Work. The bust of Victoria Della Rovere has a drapery of black marble with eyes of Chalcedony, and Agate is a good example of earlier *Pietra-dura* (see Figure 183). In 16th Century A.D, the precious stones were used to create mosaic for the ornamentation of tables, cabinets etc., such type of work is known as or Florentine mosaic.



Figure 183: Bust of Victoria Della Rovere.

Source: "Portrait of Vittoria Della Rovere (1622-95), Grand Duchess of Tuscany - Justus Susterman."
 Portrait of Vittoria della Rovere (1622- - Justus Sustermans als Kunstdruck oder Gemälde.
<https://www.kunstkopie.de/a/susterman-justus/portrait-of-vittoria-dell-3.html>.

The West adopted these techniques from the East. They introduced the techniques of mosaic ornamentations with flat gems or coloured pastes set in cells are called Orfevreri cloisonné. The Asiatic jewellery of this type is dating back to the 8th century B.C. The earliest known example of inlay work is in gold, with amber. This fashion was innovated by the Sarmatians in south Russia before coming of Goths, who copied this tradition and transferred it to the other tribes as a result of their migrations. This fashion entered into the Roman and East Roman Empire earlier (Jones 1910).



Figure 184: Example of Orfevreri Cloisonné.

Source: “Cloisonné.” Cerámica Wiki.

<https://ceramica.fandom.com/wiki/Cloisonn%C3%A9?file=Cloisonneming.jpg>.

In ancient China, gold and silver were used in rugs, these metals were used to inlay in bronze vessels during the Warring State era in the 4th century B.C. The Gold inlay was decorated on the surface of bronze or copper as a thin layer. However, this tradition was due to accumulation of ages, and India is not naturally creative in precious and semi-precious stones (Hustler 1886). The Makrāna in Rājputāna has the resource of fine building material so that all of the beautiful structures are constructed in white marble. (Burn 1987).

The Art of building acquired new modifications where the chisel of carvers was replaced with a more refined tool of marble cutting, and polishing. The original texture of marble was sufficient to provide quality of any structure or any other ornamentation on relief panels. The Vimala Temple of India is a good example of white marble, which is constructed entirely in it (Brown, Indian Architecture (Buddhist and Hindu Period) n.d.). There are 23 precious and semi-precious stones commonly used in the Indian art of *Pietra-dura* except for some stones. The stone which are not from Indian territory are also available in the markets.



Figure 185: Example of Commesso di *Pietra-dura*.

Source: Inlaymarblecrafts. “Italian Inlaid Coffee Table: Italian Marble Coffee Table Designs.” Inlay Marble Crafts. <https://inlaymarblecrafts.com/single-product?product-id=ES46150202&visible=true>.

***Pietra-dura* in the Sub-Continent by Mughals**

Pietra-dura is an Italian technique of engraving and setting beautiful stones in different patterns. The artisans of *Pietra-dura* came to the sub-continent and passed on this technique to the local craftsmen in the subcontinent. There are traces of *Pietra-dura* in the times of the Mughal era structure, but most of the crafts were vandalized by Sikhs as they did a lot of damage to the *Pietra-dura* by stealing precious stones from the buildings. The art of *Pietra-dura* in the Sub-continent exists in Tomb of Itimād ud Duala, Shīsh Maḥal, Jahāngīr Tomb, Motī Masjid and Dīwān-i Khāṣ.

Tomb of Itimād ud Duala

It is the earliest building of the Mughal era built-in polished white marble where the technique of *Pietra-dura* was applied for the first time. The ornamentation of the tomb covering every inch of the surface with precious and semi-precious stones (see Figure 186). This technique was used in the tomb for the first time in Mughal architecture. Most of the ornamentations like carving, painted panels, stucco muqarnas and marbles screen are vandalized. This monument was designed in a manner that to give a glimpse of a beautiful picture rather than a massive structure (Brown, Indian Architecture (Buddhist and Hindu Period) n.d.).



Figure 186: *Pietra-dura* ornamentation of the Tomb of Itimād ud Duala Agra India.
Source: Platongkoh. "Facade of 'Baby Taj' Mausoleum in Agra - a Draft of the Famous Taj..." iStock
<https://www.istockphoto.com/photo/facade-of-baby-taj-mausoleum-in-agra-a-draft-of-the-famous-taj-mahal-gm926721662-254269542>.

***Pietra-dura* in the Reign of Shāhjahān**

Tomb of Jahāngīr

The tomb is decorated with fresco and *Pietra-dura*. It is the contribution of Shāhjahān to his father's burial in the form of *Pietra-dura*. The marble cenotaph covering the grave has the ornamentation of naturalistic floral motifs in *Pietra-dura* work of precious stones like *lapis lazuli*, carnelian, turquoise, amethyst; it is the finest work done during the entire Mughal period (see Figure 187). (Razvi 2017).



Figure 187: Cenotaph of Mughal Emperor Jahāngīr covered with *Pietra-dura* Work.

Motī Masjid

The mosque has a small structure decorated with various ornamental features covering interior and exterior. According to the Historic records, it is a general belief the Motī masjid might have been constructed with Daulat Khāna-i Khāṣ-o ‘ām of emperor Shāhjahān. There are similar mosques constructed in Delhi and Agra, and it was a common tradition of the Mughals to associate the name of mosque with precious stone and personalities. The Façade of the mosque is decorated with precious and semi-precious stone in the form of *Pietra-dura* on the border panels (see Figure 188). The ornamentation consists of floral and geometric patterns at a regular interval.



Figure 188: Moti Masjid Lahore: Border of Facade has the *Pietra-dura* Decoration.

Tāj Maḥal

The *Pietra-dura* in the Shāhjahānī architecture is used on the walls of architectural spaces. The Tāj Maḥal is one of these examples. The *Pietra-dura* is used to decorate the white colour marble in the following area: The lower inner wall of the cardinal pishtaqs; The lower wall of the cardinal chamber, the lower wall of the central chamber, the octagonal screens of marble, Upper cenotaph of Mumtāz Maḥal and Shāhjahān and on the cenotaph.

The first ornamentation is at the four cardinal pishtaq of the Tāj Maḥal. The dado panels of the Arched structure have the depiction of floral motifs in white marble. The border of these panels is decorated with *Pietra-dura* ornamentations. (Koch, 2006:137 and Volwahren, 1970:95). The trellis framework has two different floral forms; one has a bloom of dark green jasper with a central petal of three on each bloom. The second type of bloom is yellow and red jasper with agate having five waved petals. At the end of the dados, the same bloom is present around a five-lobed cartouche.

The *Pietra-dura* is also applied on the four chambers creating a beautiful scene of continuation between both interior and exterior. In this area, the dados are framed in floral motifs. The jasper and carnelian blooms are decorating the black marble framework. Along with carnelian flower contains five petals.

The same ornamentation of *Pietra-dura* is used on the relief of dado panels that has recessed niches of the central chamber of the Tomb. The ornamentation of dados in conjunction with marble flowers creating a floral scene that covers the cenotaph. This is creating concentric ornamentation around the chamber's central area.

The Common gemstone used for the *Pietra-dura* Ornamentation in the Tāj Maḥal are *lapis lazuli*, onyx, carnelian, yellow and red marble, and jasper (see Figure 189). That represents the variety of different stones paved to the outer area of the Tāj Maḥal. The basic structure of trellis frame has heart-shaped, with two lines curving on either side.



Figure 189: Trellis frame ornated with heart shape *Pietra-dura* work at Tāj Maḥal Agra.
Source: “Parchin Kari, Outer Face of Marble Screen, Photo: Rupinder Khullar 2000 ...”
https://www.researchgate.net/figure/Parchin-Kari-Outer-Face-of-Marble-Screen-Photo-Rupinder-Khullar-2000_fig4_26502803.

Each heart-shaped ornamentation has the five-petal bloom of yellow marble and onyx. The curved lines have two leaves on each end, with serrated ends in Jasper. At the connecting points of the heart shape figures, there are two-three petalled flowers decorated with carnelian and sometimes *lapis lazuli* and agate.

The next area of *Pietra-dura* is an eight-sided marble screen surrounding two cenotaphs in the center. The depiction of floral motifs is showing the observation and knowledge of horticulture. However, these motifs are modified to achieve a hyper-real scene of beauty. Most of the floral motifs are identifiable, like tulips, irises, and narcissi.

Both faces of the screen on each side is decorated with floral motifs. The screen is composed of three marble jalīs. The border of the screen has a series of black colour marble cartouches. It has floral motifs and foliage decorated with gemstones. On the outer face of the screen, this flower ornamentation has fully blown lotus as chrysanthemum that carefully ornated with carnelian in different shades (see Figure 190). Three tulips buds are arranged in a systematic manner on either side of the lotus flower. On the inner side of the screen, there are seven heads on cartouches of flowers like the tuberose design in carnelian and garnet.



Figure 190: Ornamentation of marble screen at Tāj Maḥal Agra.

Source: “Parchin Kari, Outer Face of Marble Screen, Photo: Rupinder Khullar 2000 ...”

https://www.researchgate.net/figure/Parchin-Kari-Outer-Face-of-Marble-Screen-Photo-Rupinder-Khullar-2000_fig4_26502803.

Shīsh Maḥal, Lahore Fort

The palace has multiple ornamentations, including the *Pietra-dura* work with different colours of precious stones forming various patterns. However, the *Pietra-dura* work provides a luminous effect in the palace. These motifs are depicted in different areas. The bases of the pillars are decorated with Tulip blooms of red and yellow colour with a combination of blue borders and green leaves tessellated in a heart shape flowering pot. The red colour flowering pot has a pedestal and two voluted lines on each side. The pot has two voluted leaves attached on both sides. The whole imagery is enclosed in a cloud-like frame with attached pendants on each edge (see Figure 191). The lower rectangular portion of the base has alternating curved lines with multi-colour pendants.

The lower section of the base has a black colour marble inlaid in alternating denticulate lines. Furthermore, it has small, pointed arches on the top of the base with connected Chinese cloud collar motif. The shaft of the pillar has black colour projecting triangular patterns.

The bands above the spandrels have a different design of Islīmī Khatamī enclosing the flowering plants with blooms and buds at a regular interval. The Plant has a single orange bloom, two orange buds, with leaves. The exterior of the palace has a band known as Siḥrā, ornated with alternating round arches and Chinese cloud colour motif.



Figure 191: Detail *Pietra-dura* work at Shīsh Mahal Lahore.
Source: Archeology Department of Punjab.

Naūlakha Pavilion

Mughal emperor Shāhjahān, on the other hand, has left a mark of his own as he is known for being responsible for constructing a lot of historical monuments that are even alive today in one form or the other, which is remarkable. All of these places held a place in Shāhjahān's heart, but the place that is said to be the closest to his mind and heart is the Naūlakha Pavilion.

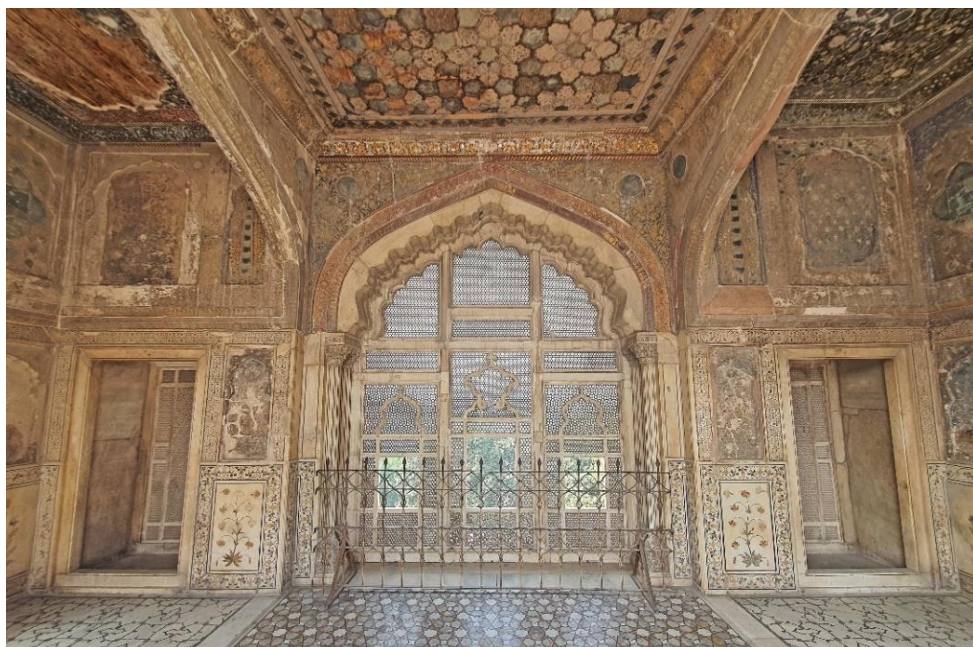


Figure 192: Interior of Naūlakha Pavilion.

There are different stones used in the art of *Pietra-dura* inside the Naūlakha Pavilion. These stones ranged from different sizes and shapes, which were fit inside of a marble slab in different patterns and designs of different flowers and trees. The most amazing thing about these patterns is that some of them were so small and delicate that even the most skilled worker had to spend an enormous amount of time to get it right. There are not many people present in today's time who can say that they have mastered the art of *Pietra-dura* like the people who used to work on it in the Mughal times. Even today, the people who are skilled take countless amounts of time to make the art of *Pietra-dura* look clean and smooth. It is worth thinking that the people who were responsible for the art of *Pietra-dura* in constructing the Naūlakha Pavilion had so much skill and art that it might not even be possible for all that skill to be present in a person today. (C. Asher 1992)

The evidence of *Pietra-dura* in the Shīsh Maḥal is the twelve pillars present inside the building. These twelve pillars are said to be the most prominent evidence of the art of *Pietra-dura*. The connected capitals of the pillars decorated with multiple small niches bordered with black marble. All the niches are decorated with vegetal imagery in different colours. The pair of pillar has a single modillion ornated with alternating floral vines (see Figure 193).



Figure 193: *Pietra-dura* work on the columns of Naūlakha Pavilion.

The most prominent work of *Pietra-dura* in the Naūlakha Pavilion are the different flower containments that are present in its vicinity. These are most visible of their locality and the different colours and shades. These traces of *Pietra-dura* are visible in the overall building of the Naūlakha Pavilion even today, which shows just how important and valuable this art was for the people who had the Naūlakha Pavilion constructed also for the people of those ages.



Figure 194: Floral and Geometric Motifs Ornated.

Process of *Pietra-dura*

In the traditional technique of creating *Pietra-dura*, the greatest attention is required. As all the processes for creating inlay ornament, whether it is tessellation or *Pietra-dura*, the tools and the techniques are almost the same. The *Pietra-dura* ornamentation is quite similar to the stone inlay work. In the first step of *Pietra-dura*, the fine quality of precious and semi-precious stones were selected and carved into the desired shape. After getting the desired shape, a pre-designed motif on a sheet used to get the traces of motifs on the surface of marble with a piece of charcoal. The next step is to carve the motifs with a sharp chisel and hammer to get a deep groove inside the marble surface, after the engraving process, stone motifs used to be fixed

temporarily to examine the gaps. After the confirmation, all the pieces were fixed with the help of adhesive material. This adhesive material was prepared with the mixture of the following items;

- White lime of marble
- Powdered marble
- Burnt zinc powder
- Gum
- Gur
- Dāl Urad
- Patacha
- Mastagi
- Tukhm-i Balanga

In the preparation process, the gum is soaked in the water along with other materials to get a thick paste. The paste contains the estimated quantity of the listed material to get a best adhesive in the final step, the carved precious and semi-precious stone motifs were attached to surface of marble with the help of adhesive.

The following precious, and semi-precious stones were used during the Mughal reigns;

English Name	Local Name	Origin
Agate	<i>Sang-i-Gawa</i>	Banda
Agate	<i>Sang-i-Gheri</i>	Banda and Jabbalpur
Black Marble	<i>Sang-i-Musa</i>	Alwar
Bloodstone	<i>Sang-i-Dogasra</i>	Jabbalpur
Bloodstone	<i>Sang-i-Gad</i>	Jabbalpur
Bloodstone	<i>Sang-i-Pit</i>	Jabbalpur and Chalisgaon
Carbuncle, Garnet	<i>Sang-i-Tandra</i>	Jaipur
Cornelian	<i>Sang-i-Aqeeq</i>	Camby
Conch-shell	<i>Sankh</i>	Sari Lanka and Dwarka
Coral	<i>Munga</i>	Sari Lanka and Dwarka

Glass	<i>Sing-i-Sitara</i>	Sri Lanka and Dwarka
Jasper	<i>Sang-i-Badal</i>	Jabbalpur
Jasper	<i>Sang-i-Galahra</i>	Jabbalpur
Jasper	<i>Sang-i-Jaiswar</i>	Jabbalpur
Jasper	<i>Sang-i-Ratak</i>	Gwalior
Jasper	<i>Sang-i-Tilai, light yellow or gold</i>	Gwalior
Jasper	<i>Sang-i-Udha</i>	Jabbalpur
Lapis Lazuli	<i>Sang-i-Lajward</i>	Dehli
Malachite	<i>Dana-i-Farang</i>	Russia
White Marble	<i>Sang-i-Marmar</i>	Jaipur and Makrana
Mother of Pearl	<i>Sip</i>	Goa and Sri Lanka
Onyx	<i>Sang-i-Lasania</i>	Broach
Serpentine	<i>Sang-i-Margaz</i>	Mysore
Shell	<i>Kauri</i>	Local
Turquoise	<i>Firoza</i>	Tibet, Iran and Iraq
Turquoise	<i>Sang-i-Abri</i>	Jaisalmer
Turquoise	<i>Sang-i-Ajuba</i>	Sabalgarh
Turquoise	<i>Sang-i-Chitla</i>	Narbada River
Turquoise	<i>Sang-i-Gudaria</i>	Gwalior
Turquoise	<i>Sang-i-Khattu</i>	Jaisalmer
Turquoise	<i>Sang-i-Simaq</i>	Saudi Arabia
Turquoise	<i>Sang-i-Zahrmuhra or Paizahrmurha</i>	Ajmer and China

In the Modern process most necessary step that is performed by the craftsman is to carefully collect the stones which are of different colours and different shapes so that the end picture can be made to look extremely beautiful.



Figure 195: Traditional process of *Pietra-dura* Work.
Source: Archeology Department of Punjab.

Since the stones to be fit inside the structure need to be perfectly cut and matched, the next step after collecting different stones of different colours is to carefully cut the stones into different shapes and different sizes according to the requirements set by craftsman. For this purpose, craftsmen make use of a narrow blade-like tool which resembles a saw. This is used to cut the stones into different shapes and sizes while also maintaining the smoothness of the sides of the stones. The most common sizes in which the stones are cut at this stage is usually 3mm and 4mm. The use of a saw blade was because of the fact that it could be used to achieve a certain smoothness and cleanliness which was very important in the whole process of *Pietra-dura*.



Figure 196: Cutting Process of the Stones with a Blade.

After the careful cutting of the stones is finished, the next step of *Pietra-dura* is to add a protective layer to the stone just to make sure that the stone does not break at a later date very easily. The stones chosen for the purpose of being used in *Pietra-dura* are carefully picked after a lot of hassles which is why it is a common practice to actually do something to protect the piece of stone from anything that may damage it. For this purpose, the different pieces of stones are attached to another material so that it could be protected in order to save it from any foreseeable damage in the future. This has a lot of benefits for the structure of *Pietra-dura* in the long run.



Figure 197: Protective Layers on the Stones to Protect from Damages.

The next step in *Pietra-dura* is to make patterns or drawings onto a piece of paper in order to see how these flowers and patterns will give a final look. This process of drawing different designs and patterns onto a piece of paper goes on until a perfect aesthetically pleasing shape is not achieved.

Although there is no hard and fast rule of what the artisans are going to draw first onto a piece of paper, it is a common practice that the artisans will choose to draw the patterns of flowers onto a piece of paper before deciding to draw any other patterns. After the artist has completed drawing a beautiful pattern of flower onto a piece of paper, this piece of paper is then cut and attached to a particular piece of stone with the help of glue.



Figure 198: Tracing of the Floral Motifs.

The next step is to cut those pieces of stones by making use of a thin piece of blade which looks like a saw. The purpose of cutting those pieces of stones to make them more refined and smoother. Without this step, all the stones to be fitted will not come out to be smooth, which will, as a result, make the whole end picture come out to be bad and messy.

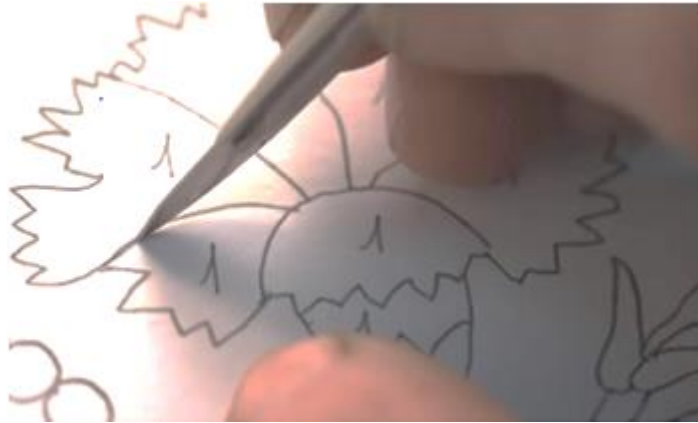


Figure 199: Drawing of the Motifs on Paper.

The cutting process involves a lot of time and energy by the craftsman if he is using the manual tools. In modern technology, the laser and waterjet cutters are the finest tools to get a perfect shape without waiting too long. The manual cutting was performed by the combination of other materials such as the mixture of carbon and silicon, which is mixed together to get silicon carbide. This mixture of carbon and silicon is also called carborundum, which helps a lot in the cutting process for craftsmen. Without this mixture, the process of cutting can become highly complex and can even damage a large number of stones used in the process. (C. Asher 1992)

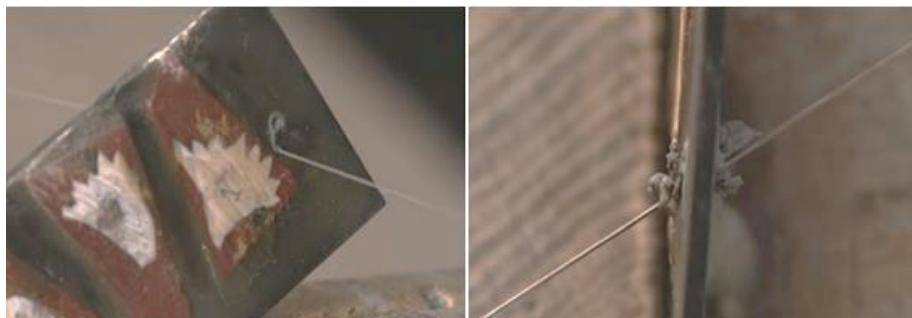


Figure 200: Cutting Process of the Stone Motifs.

The cutting process does not end here. There are a couple of other precautions as well, without which the cutting process will become highly complex. One of these processes involves the way the stone is cut from different sides and different angles.

The most common practice of craftsmen is that they prefer to cut the stones at an angle of 30 degrees. The concept behind this is that when the stones is cut at an angle of 30 degrees, then it becomes extremely easy for craftsman to complete the next process, which involves filling the stones in order to leave no messy work. A cutting angle of 30 degrees allows the craftsman to accomplish a neat and clean surface of the stones with only focusing on partially filling up some sides of the stones. The stones are then placed down on the surface with their upper side towards the ground.

The filling process is one of the most important parts of the art of *Pietra-dura* as it makes sure that all the pieces of the stones fixed at a surface are properly fixed and in place. The mixture that is used to put all the pieces of the stones together is called *Gesso*³⁷. This *Gesso* is a mixture obtained by mixing glue and chalk together.

The next step that craftsman performs is to take out different shapes and designs which were drawn onto the stones earlier. For this purpose, the craftsmen use different types of paper sheets which are curved and designed into different shapes and sizes, which help them take out different types of designs from the designs drawn in different parts of the different stones which were chosen to be fitted in the wall or a surface. It is worth noting that these paper shapes do not take out the actual full picture but rather just depict the outlines of those drawn shapes.



Figure 201: Filling of the Gaps with the help of Paste.

The next step is that craftsman manages to make small holes into the slabs of marble. These small holes in the marble slabs act as a pathway for the wire of the saw that will be later used to cut in the marble slab. The holes are made so that it can become quite easier to actually cut the slabs once its wire enters those drawn holes. Without these holes, all the cutting of these marble slabs is still possible but will not come out to be as smooth as it can be attained by cutting throw those holes.

³⁷ Plaster of paris



Figure 202: Drawing of the Motifs on the Stone with a Metal Tool.

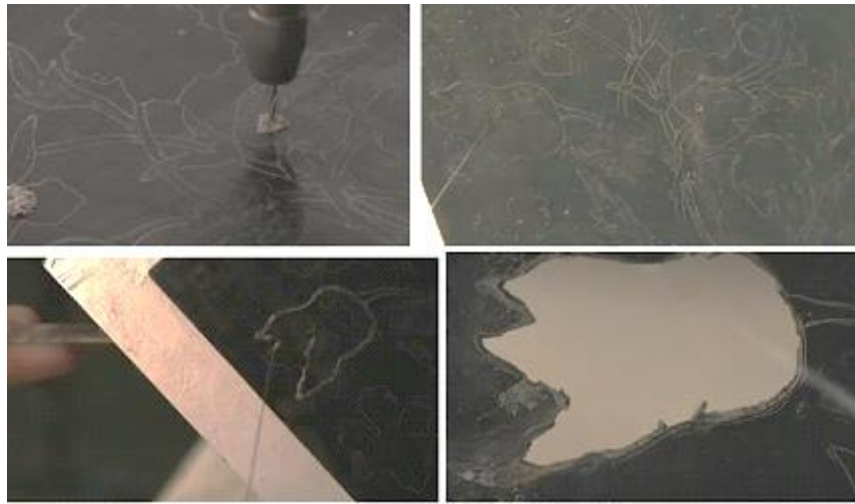


Figure 203: Carving the Drawn Motifs.

The next step in the technique of *Pietra-dura* is to thoroughly fill all the sides and corners of the pieces of stones with different types of adhesive materials onto the back of each stone. This will cause all the stones to be easily fixed in the frame which is made by a craftsman.

The subsequent step in the process of *Pietra-dura* is to remove the excess amount of glue from the back of all the stones because it can sometimes cause the overall process to slow down in the long run because then the overall picture that is to be attained can be distorted which can cause a lot of time and effort to be wasted. It is therefore considered by craftsman to remove the extra adhesive materials before it causes some damage to the big picture in the upcoming steps. The area from which the paste of glue is removed and in turn replaced with another paste-like material called Gesso which is a mixture of glue and chalk. The mixture of Gesso does not have the same side effects as simple glue.

The following step in the technique of *Pietra-dura* is to patiently wait for all the gesso to dry out. Once it does, the next step is to carefully tidy up the marble slabs. This is done by the process of polishing the marble slabs thoroughly to make sure that the backside and the front side are properly on the same level above the

ground once it is fixed onto a surface. This step is very important because it adds to the overall cleanliness of the entire process.



Figure 204: Process of Marble Polishing.

After a picture has been formed by properly joining and fixing small pieces of stones together, the next step is to properly polish the end picture by using a special type of stone which is called agate. It is basically used as a semiprecious stone. This process is done until the picture is fully polished and a clean image of the desired picture is attained. After this, wax is applied to the attained picture in order to obtain a perfect desirable pleasant image.



Figure 205: Final Process of *Pietra-dura* after Applying the Wax.

Analysis

Generally, *Pietra-dura* is the art of carving precious and semi-precious stones. It was practiced in ancient times, transmitted from ancient Romans to Indian craftsmen as a gift presented to the emperor Shāhjahān. They adopted the techniques of creating alluring art. These techniques remained the same throughout the 17th century A.D to the modern time. A few modifications can be seen in the modern time as the shaping of precious and semi-precious stone are done with the help of machine grinders and polishers. In the shaping, a machine saw is used composed of copper or

phosphor bronze along with a diamond grit on the outer edge, which rotates with the help of a motor and thousands of surface feet in a minute literally scratching the gemstone. A liquid oil or water is used to clean the debris along with minimizing the overheating of the saw blade. An ancient alternative tool known as Jigsaw is also applied for cutting or shaping the stone.

Another modification in the technique is grinder, as in the old time, the gemstone was used to rub on a hard surface to get a proper shape. Nowadays a grinding machine is used that consists of a silicon carbide wheel or diamond-impregnated wheel to shape the precious and semi-precious stones. This type of shape is known as a preform. Silicon carbide or a diamond approx.: 60 grit or a mesh approx.: 400 micron that varies up to 1200 grit applied for the final shaping of the stones.

The ancient world used abrasive manually to make stone surface fine by just rubbing it. This process is also modified with a motor-based machine with an attached belt sander to remove the deep scratches left by the grinder. New addition of a lapping machine makes the shaping procedure easy. In this type of process, a flat vibrating disk is attaching with a machine usually when a flat surface stone is required. Polishing a stone is easier than it was in ancient times. It is the final step. In this modified process, a fine quality of a diamond is used to provide a mirror-like finish and light reflection surface. It works along with other chemical agents like tin oxide, aluminium oxide, chromium oxide, cerium oxide, silicon dioxide or ferric oxide.

Apart from the stone shaping technique, the engraving, the layout of motifs on the surface is quite similar to the ancient technique. But it can be replaced with modern cutters and drillers. As binder which are used in modern time are synthetically produced in industries and has a wide range of applications. However, the time consumption for the craft making processes is less. All of the materials are available in the market which is ready to use, including precious or semi-precious stones.

Chapter X

Experts Opinion/Analysis

To conduct semi-structured interviews, the respondents were reached out at their workplace on the decided day and time. The questionnaire comprising ten open-ended questions were prepared. While conducting the interview, the respondents were encouraged to expand the related knowledge on the subject matter. The responses of interviews were further subjected to thematic analysis. For this purpose, five major themes were prepared;

1. Understanding of crafts and architectural crafts
2. Understanding about historical influences
3. Understanding of traditional techniques of the Mughal era
4. Views about the modern technique of restoring Mughal monuments.
5. Role of Shāhjahān behind the splendid quality of work

Theme 1. Understanding of craft and architectural craft

Most of the participants believed that basically craft is a skill used to beautify an item, structure or surface using different techniques to the best of the knowledge of a particular craftsman. It can be used on utensils, pots, jewellery and many other things.

However, if a craft is used in building construction, it would be called as architectural craft.

Similarly, Saleem ul Haq, ex-Director Department of archaeology opined.

“Whatever you have done on the elements involved in architecture for the purpose of its embellishment or attornment is called architectural craft.”

The architectural craft is fixed on a building, and it is confined to that particular structure. Thus, here craft becomes a fixed entity with only expansion on the building it is done for.

While the difference between a simple craft and architectural craft depends upon the surface or purpose, it is done for. For example, Mughal used inlay work to

decorate their buildings and pottery. Similarly, *kashikārī* is being used in buildings but also to make ashtrays etc.

Simple craft can be used anywhere on any surface, while for the architectural craft, you have to select a building or craft that should be fixed on a particular constructed structure. It will have to be confined to a particular element. It can't be extended from a fixed size. Thus, here a craft becomes part of that structure.

Thus, it can be concluded that craft is a skill used to beautify the surface, item, or an element it is done for, and if that surface is a building or a construction structure, the crafts become architectural craft. The difference between a simple craft and architectural craft stays with the purpose associated with the craft. A craft done on pottery would be a simple craft, while if it is done on a building, it would be called as an architectural craft. The craft that embellishes a building becomes an architectural craft. Thus according to the responses of the participants of the interview, there is no major difference between simple craft and architectural craft; the only difference is of the purpose and surface a craft is subjected to.

Theme 2. Understanding about Historical Influences

Nearly all the participants related the origin of Mughals to central Asia.

“Basically Mughals came from Central Asia, but soon they adopted the local arts and crafts with huge influence of Persians.”

The reason behind Persian influence was related to be the Humayun's exile. Humayun, during his exile in Persia, experienced Persian culture. Similarly, a respondent revealed that Humayun gained his rule back in India (sub-continent) with the help of Persian troops, and most of them settled in the subcontinent. Thus, a new era started that brought Persian culture to the Subcontinent, and not only Persian language became the official language, but the Persian craft was also appreciated among the locals. Similarly, one of the respondents stated;

“On his return, he brought a lot of technicians, artisan from Persia.”

After spending 15 years in asylum in Persia, when he came back, he had a company of Persian craftsmen with him. Moreover, his courtesans, who were exiled with him, married in Persia, thus bringing Persian traditions to the Subcontinent. That was the time when Persian culture prevailed in Subcontinent.

This significant period of time affects the architectural craft industry throughout the history. During the reign of Shāhjahān, architectural crafts flourished a lot reaching its peak. Different buildings were constructed. New crafts like mirror work were promoted due to the Persian influence in the Subcontinent. It was widely used in architecture like Shīsh Maḥal. Political stability also played a part in architecture and craft. Thus, Sajjad Koser stated;

“Most of the important conditions to flourish the architectural art and craft is peace and prosperity and political stability”.

As among the Mughals, Shāhjahān was lucky enough to have achieved all such conditions, the Mughal architecture also witnessed its best form during that period. Extraordinary and exemplary work was done during the reign of Shāhjahān.

“Failing political conditions are also visible in crafts”.

The overall political situation plays an important part to promote as well as to deteriorate crafts; for example, the Kashī-work done in Masjid Wazīr khan in 17th century A.D has no match with the *Sarro wala* tomb done in the 18th century A.D.

Similarly, the notion was supported by Saleem ul Haq as follows;

“Shāhjahān period did not see any turmoil.”

He inherited a wide area to rule, so he did not face any revolt, unlike Jahangir, who faced his own son Khosrow as the strongest rebellion right from the start. Aurangzīb had more than 50 years, but he spent most of the time in the South. He continuously fought against Mahratta's. He did not trust his sons thus imprisoned them for two years and six months. Thus, political stability participated a lot towards the improvability of the architecture.

Personal life and interest of the Mughal rulers also decided the fate of architecture during their respective reigns. For example, Saleem ul Haq believes;

“Shāhjahān was very much interested in building... in-laws of Shāhjahān were from Persia, and a lot of artisans came from Persia, so he used them properly.”

Since the personal interest of the rulers also decided the form of architecture. Both Akbar and Shāhjahān were architecture lovers, but they differed in styles. For example, Akbar's work is predominantly based on the Rājputāna style of architecture

using red sandstone like in Lahore Fort, and no marble work was done, but only for decoration like inlay work, brick structures were constructed. On the other hand, Shāhjahān introduced marble as the basic component of the construction, e.g. Tāj Maḥal.

Theme 3. Understanding of Traditional Techniques of Mughal Era

Almost all of the respondents believed that different techniques and tools were used by craftsmen during the Mughal era. Thus, the tools were so ancient that these cannot be named, while their detail is present in some books describing Mughal architecture. While talking about the techniques used for the stone lattice, mirror mosaic, stucco tracery, *Pietra-dura* and stone inlay, Saleem ul Haq said;

“They used carving for stone lattice. In mirror mosaic, they used convex lens and lead.”

All of them were with so delicacy to end in the precision that can be witness today in structure like Shīsh Maḥal and many others. In Shīsh Maḥal, mostly red, yellow, and blue colours were used for the mirror mosaic. For inlay, they did crafting in pieces of stone and decorated it with different colours and patterns. In *Pietra-dura*, they used semi-precious stone. Most of the people consider inlay and *Pietra-dura*, the same thing due to their closeness, but they are different technically.

Similarly, the construction materials were acquired both locally and imported from other parts of the sub-continent. For example, Marble was brought from Makrāna (Rajasthan) due to its perceived durability and beauty. Similarly, for construction, plundering of the already existing buildings was also done.

“Like Ranjit Singh plundered other buildings and removed marble from there to construct his own”.

The reason for such practice was that he could not find marble locally. Similarly, during Mughal rule in Delhi Tomb of Ṣafdar Jang, a similar practice is evident. They plundered Muslim period structures to construct the tomb of Ṣafdar Jang. Thus, if they could not find the material locally, they simply plundered the buildings to construct new one the way they desired.

Saleem ul Haq opined that locally available materials were also used by Mughals. For example, for *Pietra-dura*, locally available semi-precious stone was

used, e.g. Afghanistan had mines of semi-precious stones like agate and carnelian. At the same time, materials were imported from Europe. Moreover, it was a tradition that visitors used to bring precious gifts to present to the ruler. Thus, craftsmen also used to present precious stones to the emperors. The red sandstone of Dholpur (the site between Agra and Delhi) was used in the Rājputāna architecture. Mirror mosaic was locally done. The mirror mosaic has its best example in Shīsh Maḥal even the Red fort's mirror work is inferior to it.

Thus, it can be concluded that different techniques were adopted by craftsmen during the Mughal era in which both local and imported materials were used. But above, there were certain crafts that were only done locally. Mirror mosaic done in Shīsh Maḥal is one of such examples.

Theme 4. Views about Modern Technique of Restoring Mughal Monuments

Regarding the conservation and restoration of Mughal architecture, participants responded differently, relating it to their experiences. Sajjad Koser opined that;

“I witnessed that modern inlay work, especially in Naulakha pavilion floor, is a new design based on mere conjecture with no proper logic, which I actually believe is wrong”.

Thus, he believed that restoration of the Mughal architecture is being done undermining the actual and original work. The architecture is being exploited in the name of conservation or restoration. He opposed his own notion by saying;

“But at the same time, I saw in Agra Bazar there were some quality work of inlay, crafted on different things like tiny tiles, teacup mates and many other similar things.”

It reveals that quality work is possible, and it is being done in some parts of the Subcontinent.

At the same time, he also believed;

“I think that quality can be maintained even today.”

The quality of the Mughal work can nearly be achieved even today because today things have been more facilitated like electricity, laser cutting and many other

facilities. Precision can be achieved by using laser cuts in architecture. Nadeem Bashir, head of design at NCA has made a lot of furniture using the Mughal style of architecture, e.g. “lattices” used in Mughal architecture. Thus a lot of things can be interpreted in different ways depending upon the needs of the day. Similarly, he also believed that the damaged Tasīmbandī roof in Shīsh Maḥal can be constructed again even today with the same quality as before in the Mughal reign due to the availability of tools of precisions.

Sajjad opined on the issue as follows;

“Yes, the same architecture can be produced by using modern techniques. I have seen that work of kashikārī being done in Masjid Wazīr Khān is of the same quality as in Mughal times.”

He visibly appreciated the work restoration work in the mosque. The work seems to be of quality, but at same time he also stated;

“But the durability will be proved with the passage of time. Colors stability will be seen with time”.

How durable the work being done in the name of restoration will be exposed with the passage of time. Given the condition, quality is possible, but the results will be known after some time. Thus, if facilities available today are fully utilized, quality can be achieved with greater precision.

“At the same time, it also seems impossible to regenerate today”.

When asked about the regeneration of the Mughal structures, it was noted that restoration is possible with greater quality, but regeneration seems impossible to achieve. Today’s craftsmanship has no match with that of the Mughal era that produced quality work in architecture. Today the building of the past can be conserved but not exactly build in the same way they were treated in the past.

Similarly, the notion of Saleem ul Haq is as follows;

“The conservation work done can be graded three out of ten comparing to the original work”.

The original work was definitely of the highest quality, but today quality is being compromised. The major difference is craftsmanship—modern craft lacks in so many ways than that of the Mughals.

“Fineness, control, and quality of material everything was there”.

The major reason that conservation work is, unfortunately, contract-based, and estimates are prepared by the officers of the department of archaeology. They are bound to prepare it according to PW rates. But at the times of Mughals, they hired the best craftsmen who were paid according to their own demand. So, the difference can be understood that we pay according to PW³⁸ rates. In conservation works, no advanced techniques are used, and whatever artisans are available without considering their craftsmanship, they were deployed in such projects. That is why the quality was not there. Modern technology has helped craftsmanship. Thus, this should be used to boost the quality, not to undermine it altogether.

The technology cannot be implemented for each and every Mughal craft. For the matter of *“Pietra-dura”* or inlay, it is possible, but as far as stucco tracery and mirror mosaic are concerned, it is impossible. The designs on the joints need to be done only manually, not with technology. The work done by modern technology would be much cheaper than the original cost. The cost of the semi-precious stone would be the same, but the labour cost would be reduced. Laser cutting will make things quick.

Theme 5. Role of Shāhjahān behind Splendid Quality of Work

Saleem ul Haq stated;

Shāhjahān was known for architecture.

“His aesthetic sense was the best among the Mughals”.

Saleem ul Haq believed that Shāhjahān earned his distinct place among the Mughal lineage in architecture. The most important reason was his personal interest in construction and architecture. No doubt other Mughal rulers also contributed towards architecture, e.g. Akbar, but he failed to meet the aesthetics of Shāhjahān. That is the reason that;

“Structures produced in his time are impossible to be reproduced today; for example, Taj Mahal is beyond imagination to be constructed today”.

No doubt, other structures like churches were beautifully built by his contemporaries around the world, but none could beat Shāhjahān’s sense of

³⁸ Punjab Government rates

architecture. Most significantly, Sultan Aḥmad Mosque in Turkey, made by Ottoman ruler Sultan Ahmed a contemporary of Shāhjahān, is very beautiful.

“But the geometrical balance found in work of Shāhjahān’s period is not found anywhere else”.

Thus, while comparing Shāhjahān’s work with other architectural construction done by different dynasties across the globe, all of them lack in symmetry and geometrical balance. The symmetry maintained in his period cannot be found among the work of other Mughal rulers.

They believed that they were not used to do it on paper as no such record can be found, and they were given geometric instructions.

Similarly, the Shāhjahān’s curiosity for architecture is also related to his profound love for his wife.

“First of all, he loved his wife very much”.

For his wife he constructed number of structures not only in her life but also after her death. He added Shīsh Maḥal (1631-1632) to Lahore Fort, but she died in 1631 before its completion. She was buried in Burhanpur for *amanat* and then moved to the present place.

“Then he started the construction of her tomb and took about 17 years to complete.”.

Such a long period given to the tomb construction reveals his fondness for his wife as well as his love for architecture.

“He had such a lust for construction.”

Shāhjahān’s profoundness for architecture was attributed as his lust for construction by Saleem ul Haq. The reason was that he continued back-to-back constructions of different structures across the sub-continent. He did not rest for a bit of time rather, he moved towards the construction of Red Fort, Delhi, soon after the tomb of Mumtāz. In the meanwhile, He also completed Shālīmār Garden in Lahore. He was fond of gardens he constructed in Delhi, then in Kashmīr. It is also said that when Mumtāz’s tomb was completed, he wanted to build one for himself, but he moved towards Delhi Fort.

Similarly, other respondent of the interview Sajjad Koser related remarkable architecture of Shāhjahān's era with the political stability.

“Time was appropriate, stable and booming economy, Mughals were in rule since long and above all his personal taste was also the plus point”.

Sajjad Koser also referred to a book about the Shāhjahān's extraordinary understanding of architecture. He said that Bari Ali quoted in his book that Shāhjahān had remarkable sense of architecture and construction that once he visited a building and suddenly asked the people to leave the building as the roof was about to fall. People obeyed, and the roof fell.

Among the Mughals, two were called city builders Akbar and Shāhjahān. Akbar for Fatehpūr Sīkrī and Shāhjahān for Shāhjahānabad. Richness found in Shāhjahān's work could also be related to his huge experience and exposure to already existing architecture of previous Mughal rulers. The participant believed;

“His was the time with buildings of Akbar's and Humayun period”.

Observing all that previous work, he had huge opportunity. For example, Babur could not have such an example thus, he created by his own. Thus, Shāhjahān learnt a lot from the previous work and his aesthetic sense added to the opportunity, resulting in unparalleled structures like Tāj Maḥal. Bābur and Jahāngīr are called inclined towards gardens while Shāhjahān and Akbar are city builders. Thus, extraordinary work in architecture during Shāhjahān's period can be associated with his personal interest, knowledge of construction, political and economic stability, and already existing architecture.

Conclusions

At the outset of discussing the Mughal epoch, as far as the rulers are concerned, six of all were deemed as powerful rulers, till Aurangzīb, who unfortunately did not train any of his descendants in the military and so they failed in upholding the kingdom after his demise. As a result, one after another, incompetent successors came, especially in Punjab. Before the Afghans attacked and took over, Ahmad Shah Abdali came and looted many places, including Lahore, during the Mughal era. After which, Mughals were unable to establish strong reigns in Lahore. In 1764 A.D, after the battle of Panipat, Lahore was divided by three Sikh rulers, Laila Singh, Gujjar Singh, and Sobḥa Singh, among themselves. Laila Singh stayed in Lahore Fort; Gujjar Singh stayed in *Qila Gujjar Singh* while Sobḥa Singh accommodated himself in Jahāngīr's Tomb. Afterwards, for a short period, Afghans confiscated the states again, later expelled by Ranjit Singh in 1799 A.D. He started his rule in Lahore and began to capture nearby areas of Lahore like Kasur, which was very famous at that time, then Multan, and then Peshawar. He conquered one after another till Kaśhmīr. He was from Wazīrabād; his father and grandfather were rassagīr³⁹. These rassāgīrs turned into rulers as their group grew in size. When the group raised more, it took the shape of an army among which the commanders were delegated, and lastly, they were capable enough to make a government of their own.

Regarding arts and crafts during the Shāhjahān era, Mumtāz Maḥal died during the construction of Shīsh Maḥal. Builders and craftsmen having a keen interest in the construction of Tāj Maḥal migrated towards Agra, leaving the construction of Shīsh Maḥal incomplete, which might not have any proof in literature, but the incomplete engrave drawings of floral motifs in some areas stand proof to that. It can be seen on spandrels and borders above spandrels. After the completion of the Tāj Maḥal, the other major projects such as the Lāl Qila started and so after the demise of Mumtāz Maḥal in 1631 A.D, the craftsmen of this region migrated towards Delhi and Agra to be employed there. Hence the decedents of these craftsmen can still be found in that region, working to master their skills. Although it was Aurangzīb who came to Lahore and ordered the construction of the Bādshāhī Mosque, it was Kāfi Khān who overlooked its consummation in the Sikh era. Sikhs might be engraved into history as transgressors; they have brought many ongoing projects to their completion rather than dismantling them. While 1671 A.D is listed as the year of completion for the

³⁹ Rustler

Bādshāhī Mosque in history, it was however incomplete then, which can be seen in the pictures taken in the late nineteenth century where you see the muddy floor of Bādshāhī Mosque with trees in it which indicates its partial completion.

If compare the craft of Bādshāhī Mosque to that of Shīsh Maḥal, which was the center of attraction in Lahore Fort. Bādshāhī Mosque is massive in terms of a single entity, but Shīsh Maḥal is discrete and elegant in style in terms of craft, specially *Pietra-dura*. On witnessing the detail, *Pietra-dura* has to offer, which is used abundantly in Shīsh Maḥal one can see it was also priorly used in Jahangir's tomb especially on the cenotaph and is not to be seen anywhere else in Punjab.

The buildings constructed in the early sixteenth century such as Dīwān-i ʿAm, Dīwān-i Khāṣ, Shīsh Maḥal, and Jahāngīr Tomb all were made in this era. Noṛlakha, the cenotaph of Jahangir's tomb, and the Shīsh Maḥal are the only pieces with such craft, which however is nowhere to be seen in the Aurangzīb period when the structures were massive, but delicacy was less. Mughals also used bricks as a decorative element as in Hiran Mīnār, its bārādārī pillar is made up of fair face brick and has fine joints which make overall look quite appreciable. Similarly, haṭhī pair and Ghulām-gardish's pillar were made out of fair face brick during Jahāngīr period.

As to compare the work left undone in the Mughal era and redeemed in the Sikh era, Stucco tracery during the Mughal period was extremely refined and graceful while the Sikh work had less refined finishing neither *Pakka kali* has neat finishing, nor the quality was well maintained while entering from Khawābgah-i Jahāngīrī to Khawābgah-e-Shāhjahānī where you might notice the entrance door been closed by masonry. It looked like a frame and on been opened later; the original Mughal period stucco tracery as compared to that on the outside of it stucco tracery of the Sikh period can be seen with noticeable differences in finish and quality. Coming towards the annihilation of Mughal craft during the Sikh era, it has two components how was the basic material, especially in engraving the *Pietra-dura*, was used and how the changed craftsmen had changed techniques. Ranjīt Singh and three other Sikh rulers conquered the areas where there were no marble mines. The Marble mines were in the Mughal territory and afterward in the East India company. Therefore, the Sikhs constructed their buildings by stripping the marble from Mughal buildings and using them on their own. Aṣif Jā's Tomb, Nūrjahān's Tomb are few denoted victims. Jahangir's Tomb remained safe since it has been used as accommodation of a Sikh ruler and later on by Jān Muḥammad from Afghanistan. And for the sole purpose of

its usage as residencies, it was not denuded as the others such as Zaib-un-Nisa's, Āṣifa's, 'Alī Mardān's Tomb were completely denuded. Concluding that the explanation behind Sikhs denuding the Mughal buildings and stripping them off their materials was the inaccessibility to the construction materials for their projects.

Also, Sikh rulers were not as rich as Mughals, and they were not in a position to employ individuals with the best qualities of craftsmanship, even from nearby regions like Iran. Though Shāhjahān brought skilled workers from Iran, Italy, for *Pietra-dura*. But Ranjīt Singh was not well educated, nor his forefathers were. Neither they were fond of knowledge. On the contrary, Mughals were educated people with aesthetic sense, and many were composers of their own.

Sikhs were not keen on workmanship and art; they were essentially warriors. All their art and craft were adopted from Hindu culture, despite their religion been different from Hinduism. Having no art and craft sense of their own, they just copied Hindu crafts and paintings. Their governors were also of Hindu origin, about whom a few historians say, were not converted from Hinduism to Sikhism wholeheartedly. It was merely for gaining high positions and strength but the work they produced under their supervision show cultural influences.

The craft that was produced during the Sikh era was mainly wooden craft/woodwork; the reason behind this could be its easy availability in origin. Hence, they preferred carving wood instead of stone. Roofs were made of *tersīmbandī*, and if you happen to see a Sikh building, you would notice how on the contrary to Mughals' utilizing vault roof in stone and brick, Sikhs had used wooden planks with *tersīmbandī*. Brick use was additionally expanded in Sikh time rather than stone, however with elegance. They used brick as a finishing material for their buildings. Hāḍurī Bāgh Bārādārī has a bit doubtful floor which is made up of stone was seemed to have been removed from different buildings, but the basement is made of reinforced concrete with steel about which there is no record of when it was made. It was done sometime during the British era, but it has no record.

During the Sikh regime, the Shīsh Maḥal was under the control of Ranjīt Singh and as well as Sikh rulers that came before him. He never used the conventional *Jharoka* that Mughals were quite fond of. He made an *athpera* outside the Shīsh Maḥal with looted material, the pillars, and roof of which were made up of wood with *tersīmbandi* beneath it. The entrance of Shīsh Maḥal was also changed by him by which was originally in the place of *athpera*. He made his court there and shifted the

gate on one side. The art of ā'īnakāri can be seen clearly in Shīsh Maḥal and Ranjīt Singh's Samādhī in Lahore whereas the one been done in Lāl Qila, Delhi seems very ambiguous which might manifest that the masters of ā'īnakāri belonged to Lahore/Punjab. Now to discuss the conflict of periods, it can be seen how the Shīsh Maḥal does not have any vaulted roofs whereas the other buildings of the said era, such as Mughal buildings in Agra and Delhi, like Dīwan-i 'Am had their roofs covered with red sandstone slabs. However, the rooms of Shīsh Maḥal designated for the winter and summer seasons had vault structure roofs. The main Dālān with huge shehtīr on them, which were further supported by additional wooden structures below, on which we can see ā'īnakāri. The same style can be seen in the shehtīr structure above Shīsh Maḥal, which was built in the Sikh period. Besides, many shehtīr (purlins) had impressions such as Sarkar-e-Aala written on them in Urdu, which is believed to be Ranjīt Singh's signature style. This, however gives reasonable doubt that this work might not have been done in the Mughal period. The shehtīr was bought from Kashmir through riverside and for recognition that this luggage belongs to whom the name or tag of the proprietor was etched on them. Along these lines, it portrays possibly this work was done in the Sikh period rather than the Shāhjahān time frame.

On an off chance that you notice the dado line, we see a marble slab which can likewise be seen in Doulat Khāna-i Khas-o 'Am, and that was not profound either. Besides, as it had been portrayed that Shīsh Maḥal was left incomplete, it might be a possibility that after the experts left this place, some other workers completed it by a less complex dado and failed to do it as magnificently as done in Tāj Maḥal, where carving on end of dado engraving is done by descending flowers showing that they are downhearted by the demise of the queen. The construction during this era was a huge downgrade in materials. If we see fresco work flowers and leaves during the Sikh era, no original craftsman was available to do it. Faqīr 'Azīz al-Dīn, the Wazīr-i Khārja of Ranjīt Singh, himself played a role in the fresco work of Shīsh Maḥal, which shows how instead of expert craftsmen, the work has been done by amateurs. Colour combinations and colour choices were also different in the Mughal and Sikh periods. The Sikh period starts in 1799 AD and ends in 1847 AD, after which the British period started in this region. Lahore was courted in 1846 AD. However, no proof can be seen in literature that the work was somehow left incomplete for some while and then taken on by the Sikhs later, but physical evidence could not be seen.

Comparing the British era, there are many noticeable big structures such as Lowrance Hall, Punjab Club, Staff College, etc., which were developed according to their taste and temperament. The building is a way of communication; rulers construct such splendid palaces so that they can create a pressing factor and impact on the public by establishing a powerful influence that showcases their money and assets and invalidates any endeavours of rivalry. The same level of tactics was used by the Britishers; they did not use old buildings of Mughals or Sikhs and preferred constructing their own structures for their officers with higher ranks, while the older buildings were used for by the soldiers of lower ranks.

Firstly, these buildings were for royal use; after the British took over, these buildings got converted into garrisons. Soldiers, mainly captains/majors and their subordinates, utilized this place ruthlessly by removing the precious stones from Shīsh Maḥal and leaving behind the graffiti prints wherever they stayed. The evidence of them razing the place can be found in doulat khāna khās-o-‘Am. If you see Abkari Darwāza, you can see the graffiti about regiments to which soldiers belong. It is apparent that they had no intrigue in protecting these structures as they continued harming it, and as opposed to fixing the fresco parts, which may have demonstrated to be costly, they favoured whitewashing the entire palace. Kāla Burj of Lahore Fort was completely whitewashed the same way the birthplace of Shāhjahān near Jahāngīr’s Khawābgah and Shalīmār Garden was, since it was the cheapest and cleanest solution to renovate the place, you just mix water with lime and sweep the area with it.

One of the main reasons for them to take this route was their temporary residence at such places during their reign here before they got transferred elsewhere, and hence, they preferred not to invest their money in such structures as they were also advised against it by East India Company. Their survival on a limited budget allotted to them became one of the reasons that led to no restoration of buildings in their era. Furthermore, over time technology start developing. Their iron steel industry was pretty developed; if you have a look at the bridges that were constructed in that era, the material was all imported from Britain. Regarding building construction, if a house was to be constructed, steel trusses were used in them, which began the trend of false ceilings.

Moreover, if Mughal had use stone for the decorative work, the British preferred wood with polish on it; they worked a great deal in it. A massive wooden door with strong hinges was introduced. Mughal door has stone hinges in floor and

lintel height, and the mechanism was not that strong, but the British made it stronger. The Mughal used chains for locking the door while the British used latch due to which door became sound and windproof. They had advanced technology, and they properly utilized it. Their engineers worked on evidential mechanisms while the Mughal was more of an accidental fluke. They also had better planning by making optimum usage of the space contrary to the Sikhs and Mughals, who built robust structures inside the building, leaving large spaces vacant. The usage of bricks benefited them with cost-effectiveness. They did not have to use any plaster because plaster alone could not do justice. It has to be decorated like stucco tracery or naqqāshi so that it may look good, but the cut brick work or plain brickwork alone used to beautify the building, and it became magnificent beside it lowered the maintenance cost as the climatic conditions of excessive rain were kept in mind. Hence all the naqqāshi had to be overhauled each year considering the fungus the moisture. In a nutshell, it was clever and efficient to make use of fair-faced brick.

After Pakistan came into being, buildings became simpler for residencies. The government did not have enough resources for the construction and embellishments, therefore, insisted on simpler techniques with minimal or no crafts. Hence, the craftsmen saw no resilience in the field. They chose not to train their descendants and went on to rely on fields that would earn them bread all year long rather than for a certain time in a year since the construction of government projects was dedicated to a specific period every year. Where you might see craftwork of fair-faced bricks in the private buildings of Krishan Nagār constructed during the development of 1911 AD, after Pakistan was formed, those craftsmen quit their professions due to declining demand.

Furthermore, the utilization of machinery expanded, which led to the rapid fixation of the work. In the past, it took two to three years for a simple house to be completed. It is now being done in four to six months. The architects who had very little role in the past as the proprietor used to plan the space and discuss it with masons are now designing a house including all aspects, such as electricity system and sanitary system piping, etc.

The government did not have funds, and the usage of machinery has expanded enough for a ten-man job to be done by a single man through machines. But unfortunately, machines could not bring in the handmade texture and feel of work.

The making of craft changes drastically in the past from merely handwork to machine-driven work, and Similarity brings boredom. The machine is given a command and no matter how much work you command machine would provide the same replica, which might be accurate and precise but would lack the variation and arbitrariness of the handmade work. It might bring a certain flow, but it would be distinctive as per state of mind and contemplations of craftsman, which would have turned out to be better. Take Jahāngīr Tomb for example if you see the façade, it would appear at first that the marble inlay work is similar, but if you observe closely, you will notice the *suorāhi* is distinctive in styles since the four craftsmen working on it were advised to make *suorāhi*, and all of them made their versions which were not identical. Whereas a machine would just clone it, resulting in symmetry, and on watching it more than twice, the viewer would lose interest. But hand-made crafts keep the viewer indulged even after many looks. However, the observer only appreciates the one which seems perfect and looks better. Hand-made work is not merely a work that was a creation of an artist who was proud of his work after completing it. It was not mass production. It was creative work. It was an achievement for which he used all his energies and expertise.

The Revival of these crafts seems a far fetch idea in the current era, considering we are short on budget, and a craftsman is a person who works with hand and demands money while machine work might prove modest against it.

Pietra-dura is still in practice in Pakistan but only for export purposes. A craftsman who is chiselling stone is still working, but the tools have been replaced by the machine and have forced the human touch to vanish. The touch the feel if we narrow it down is not only about hand; the type of hand and expertise of hand and feel also matter. If we see *Pietra-dura* work, the machine would not decide the type; it would just complete the given order. This however, is incomprehensible by the general audience as they have no level of attachment with the material or the craft that a worker would; they merely praise the aesthetics of it. The craftsman of *Pietra-dura* would select the stone with an emotion which is not the case with a machine; however, refinement is more with it. In a nutshell, where we might have lost the emotional touch and compassion, we gained refinement and time efficiency, which is a good bargain.

The oncoming world has a threat of being an automated world. The mechanical world will be worked via programmed apparatus rather than the

compassion of individuals since we do not have time. Deterioration spots of the world will deteriorate with automatic deterioration and will be controlled through satellite. Our every move has been automatically recorded by a satellite through the internet. You cannot hide anywhere and are been followed by a satellite everywhere. Where CNC⁴⁰ machines might be a great stone cutter, but they are unable to detect if they have been used on white marble or black, they follow the order and replica whatever is been coded for them without any emotion or feeling. Thus the human factor is missing. Take an example of a worker carving a stone; simple things like silence or environment will pay a huge impact on his mood and work, which will not be the case of a stone carved by the machine.

In the case that human factor is not as significant as we are implying to be, we might not have heard of Mona Lisa, it could have been one of a million paintings produced digitally but just to think that it was created by Leonardo and was filled with such compassion is one of the factors that turned it into a masterpiece. Similarly, the David sculpture might have been just another machine-made sculpture, but its human touch and emotions of its creator Michelangelo show it as a masterpiece in front of the world. It is the human intervention that makes their work so personal. Technology can be dehumanizing and isolating. To say it is inconceivable for it to copy human peculiarities might not be so wrong.

It is impossible to keep the old craft alive when the world is changing so drastically; all these technological innovations and the high raise in demand and population have made its existence more challenging. Comparing today with the previous eras, the Mughal period, for instance, the population was under control, and so the demand was achievable, thus requiring less production, which however, might not be the case today. But for our sake, we need to preserve these crafts and techniques, which might not get the vote of confidence for a majority, but it is what should be done. Promoting research in such crafts will help further in the cause of machines mimicking the human touch in the creation of crafts. Some might oppose the idea of it, considering we live in a world where there is an everyday need to struggle and survive and the majority lacks basic necessities of life, and in such times pressing on aesthetics might not seem a plausible option.

Lahore Fort covers an area of around fifteen acres, but the most expensive part of it is Shīsh Maḥal, which was built in the era when the rulers were flourishing with

⁴⁰ Computerized Numerical Control

resources and their focus was to make an identity for themselves, which they did as we still are researching on such structure 500 years after its construction. But those eras differ to current times, and so do the priorities. Where their focus was humongous structures and lavish architectures, ours are time, cost, and resource efficiency. Now such stone carvings can be seen in graveyards because some prefer spending there.

In the current era of the digital world, the need to keep handmade art and craft alive is important now more than ever. The charm of things created through experimentation while depending on experience and instinct is one of the most important components of our lives. The creation of craft starts with an actual feeling of connection between the raw material and the creator; this human intervention is usually what lays the foundation for a masterpiece craft. The spirit of craft is based on three linked ideas, direct insight, individual vision, and expertise; the more we rely on automated crafts, the more we distance ourselves from their original sense.

Here it might not be wrong to say that we need another arts and craft movement to once again highlight the fact that it is now need of an hour to build up more advanced craftsmen, by helping them employ implications of technology without losing the imprint of the human body that tends to make their craft more personal. To improve the quality of design, increasing the production gross and making it available to the vast public without taking away the essence of the human factor.

Transliterated Words in the Dissertation

<u>Shīsh</u> Maḥal	Sheesh Mahal
Ā'īnakārī	Ainakari
A'lahwār	A'lawar
‘Abd al-ḥāq	Abdul haq
‘Abd ul-ghafūr	Abdul Ghafoor
Abū saīd mīrzā	Abu Said Mirza
<u>Achāry</u>	Achary
Āgha khān	Agha khan
Ajīt	Ajit
Akbarī mandī	Akbari Mandi
Ālamgīr	Alamgir
Ālāmīgīrī	Alamgiri
Al-idrisī	Al Idrisi
Amānat khān	Amanat khan
Amīr khusrau	Amir Khusro
Anandāpāla	Anandapala
Anārkālī	Anarkali
Asthan	Asthan
Awār	Awar
Awārna	Awarna
Bābur	Babar
Bachā tāj	Bacha Taj
Bādshāhī	Badshahi
Bāghbānpūra	Baghbanpura
Bahādur shāh	Bahadur Shah
Bahāwalpūr	Bahawalpur
Bahlūl lodhī	Bahlol Lodhi
Ba'olī	Baoli
Bārādārī	Baradari
Batāla	Batala
<u>Bhābhra</u>	Bhabhra
<u>Bhādūn</u>	Bhadon
<u>Bhagat</u>	Bhagat
Bhāgwant dās	Bhagwant Das
Bhāiro kā asthān	Bhairo ka Asthan
Bhāngī mīsl	Bhangi Misl
Bhāṭṭī	Bhatti
Bhāvadār gāchcha	Bhavadar Gacha
Brāhmans	Brahmas
Chābndra	Chabandra
<u>Chah</u> mīrān	Chah Miran
<u>Chāhārbāgh</u>	Charbagh
<u>Chāhata'ī</u> khānate	Chahata e Khanate
<u>Chajja</u>	Chajja
<u>Chand</u>	Chand
<u>Chānd</u>	Chand

<u>Changīz khān</u>	Changez Khan
<u>Chārṣū</u>	Charsu
<u>Chār-ṭāq</u>	Char taq
<u>Chatrīs</u>	Chatris
<u>Chatrīs</u>	Chatris
<u>Chaghan</u>	Chaghan
<u>Chaukhandī</u>	Chaukhandi
<u>Chaumukhī</u>	Chaumukhi
<u>Chenāb</u>	Chenab
<u>Chihal satūn shāhi</u>	Chihal Satun Shahi
<u>Chīnār</u>	Chinar
<u>Dakhāni</u>	Dakhani
<u>Dālān i sung i surkh</u>	Dalan e sung e surkh
<u>Darghāh</u>	Dargah
<u>Dās</u>	Das
<u>Daulat khāna i khas-u-‘ām</u>	Dualat Khana e Khas o Am
<u>Dharāmpura</u>	Dharmapura
<u>Dhiyān</u>	Dhiyan
<u>Dhiyān</u>	Dhiyan
<u>Dīpālpūr</u>	Dipalpur
<u>Dīwān -i khāṣ</u>	Dewan e Khas
<u>Dīwān-i ‘ām</u>	Dewan E Aam
<u>Dogrās</u>	Dogras
<u>Duranī</u>	Durrani
<u>Faiḍ bakhsh</u>	Faiz Bakhsh
<u>Farah bakhsh</u>	Farah Bakhsh
<u>Fārrukhsiyyar</u>	Farruksiyyar
<u>Fatehpūr Sikrī</u>	Fateh Pur Sikri
<u>Faxiān</u>	Faxian
<u>Gali bhābriān</u>	Gali Bhabiran
<u>Ghālībkārī</u>	Ghalib kari
<u>Ghant mātā</u>	Ghant Mata
<u>Ghaznavid sulṭān maḥmud</u>	Ghazanvid sultan muahmood
<u>Ghaznī</u>	Ghazni
<u>Ghūr</u>	Ghur
<u>Ghūrids</u>	Ghurids
<u>Girahsāzi</u>	Gereh sazi
<u>Gur-i amīr</u>	Gur e amir
<u>Gurjāra</u>	Gurjara
<u>Gurū nānak</u>	Guru Nanak
<u>Gurudwāra dera ṣaḥīb</u>	Gurudwara Dera Sahib
<u>Guzārs</u>	Guzars
<u>Haḍūri bāgh</u>	Hazuri Bagh
<u>Hāḍuri bāgh</u>	Hazuri Bagh
<u>Hakim ‘ilam al-dīn anṣārī</u>	Hakim ilam ud din Ansari
<u>Hāthī darwāza</u>	Hathi Darwaza
<u>Havelī</u>	Haveli
<u>Hayāt bakhsh</u>	Hayat Bakshsh
<u>Herāt</u>	Herat

Hieun tsāng	Hieun sang
Hīrā	Heera
Hīra maḥal	Hira Mahal
Ḥudūd al-ālam	Hadood al alam
Humāyūn	Humayun
Hyderabād	Hyderabad
I'timāt al daula	Itimad ud Duala
Ibrahīm lodhī	Ibrahim Lodhi
Iltutmish	Iltutmish
Islīmī-khataī	Islim Khatai
Itimād ad Daula	Itimad ud dualah
Īwān	Iwan
Jalāl al dīn	Jalal ud din
Jalāl-al-dīn mingburnu	Jalal ud Din Mingburnu
Jalāu khāna	Jalau Khana
Jālī	Jali
Jalī sāzī	Jali Sazi
Jāmi masjid	Jami masjid
Jharoka-i-darshan	Jharoka e darshan
Jind kāur ḥaveli	Jind Kaur Haveli
Jodha bā'i	Jodha Bai
Kabīr khān ayyāz	Kabir Khan Ayaz
Kābul shāhī	Kabul Shahi
Kachpūrā	Kachapura
Kāla	Kala
Kālakacharya	Kalakacharya
Kāmraṇ mirzā	Kamran Mirza
Kashīkāri	Kashi Kari
Kashmīr	Kashmir
Kasūr	Kasur
Khatam sāzī	Khatam sazi
Khāwārazmian	Khwarzamia
Khayābān	Khayaban
Khīḍār khān	Khizar Khan
Khurāsān	Khursan
Khusrau mirzā	Khusro Mirza
Khusrau shāh	Khusro shah
Khawābgah	Khawabgah
Kilha-i kuhna	Kilha e Kunha
Koh-i-nūr	Koh e noor
Krishan	Krishan
Kshatriyās	Shatriyas
Kurmāng	Kurmang
Lābokla	Labokla
Lābolak	Labolak
Lāhanūr	Lahanur
Lāhna	Lahna
Lāhor	Lahor
Lāva	Lava
Lāvpor	Lavpor
Lohāna	Lohana

Lohāovar	Lohaovar
Lohārana	Loharana
Lohārghat	Loharghat
Lohāru	Lahru
Luhānagar	Lahanagar
Luvāna	Luvana
Luvānam	Luvanam
Ma'mūr <u>khān</u>	Mamur khan
Mahārāja	Maharaja
Mahārāja <u>dulīp</u> singh	Maharaja Dulip Sing
Mahtāb <u>bāgh</u>	Mahtab bagh
Makātīb <u>khāna</u>	Makatib Khana
Makhdūm <u>nūḥ</u>	Makhdun nooh
Makrānā	Makrana
Malik ayyāz	Malik Ayaz
Mālik <u>ikḥtiyār</u> -al-dīn qarāqash	Malik Itkhiyar ud din Qarqash
Mamlūk	Mamluk
Mamlūk	Mamluk
Manşūr	Mansur
Marium-al-zāmānī <u>zāmānī</u>	Marium al zamani
Maulvī nūr <u>bakhsh</u>	Maulvi Noor Bakhsh
Mihrāb	Mihrab
Mīna masjid	Meena Masjid
Mīnār	Meenar
Mīr	Meer
Mīrāk mīrzā <u>ghiyāth</u>	Mirak Mirza Ghiyas
Mīrān bādshah	Miran Badshah
Mīrza <u>ghiyāth</u> baig	Mirza Ghiyas baig
Mīzān-i'adl	Mizan e adal
Motī	Moti
Mukām dīn chāudhry	Mukam Din Chaudary
Multanī	Multani
Mumtāz mahal	Mumtaz Mahal
Munabatkārī	Muanabatkari
Mūthammān būrj	Mussaman Burj
Nādir <u>shāh</u>	Nadir Shah
Nāg	Nag
Nagīna	Nagina
Nāsir al- dīn qabācha	Nasir ud Din Qabacha
Nawāb	Nawab
Nawāb mahābat <u>khān</u> bin 'ali mardān <u>khān</u>	Nawab Mahabat Khan bin Ali mardan khan
Niāltigīn	Nialtigin
Nihāl	Nihal
Nīhr-i-bihisht	Nihr I bihisht
Nishat <u>bāgh</u>	Nishat Bagh
Nūr	Noor
Nūr al-dīn muḥammad	Nur ud Din Muhammad
Pānīpat	Panipat
Parchīnkārī	Parcheen kari

Pashtūn	Pashtun
Patīāla	Patliala
Pishtāq	Pistaq
Purānā qilā	Purana Qila
Purānas	Puranas
Qandāhar	Kandhar
Qilā	Qila
Quaid e āzam	Quaid e Azam
Qutab al-dīn-aibak	Qutab ud din Aibak
Qutb-al-dīn-aibak,	Qutb ud Din Aibak
Rāghu nāth rāo	Raghu Nath Rao
Rāj Kumārs	Rajkumars
Rājputāna	Rajputana
Rām dās	Ram Das
Rāma	Rama
Rāmāyāna	Ramayana
Rānīwas	Raniwas
Rārra maidān	Rarra Maidan
Rāshid-al-dīn	Rashid ud Din
Rāvī	Ravi
Ruqaiyah sultān begum	Ruqiah sultan begum
Salīm chishti	Saleem Chishti
Salīm Chishtī	Salim Chishti
Sāwan	Sawan
Shāh ālām bazār	Shah Alam bazar
Shāh ālāmī bazār	Shah Alami Bazar
Shāh būrj	Shah Burj
Shāh hamadān mosque	Shah Hamdan mosque
Shāh nūr al-dīn jahāngīr	Shah Nur ud Din Jahangir
Shāhdarā	Shahdara
Shāhī guzargāh	Shahi Guzargah
Shāhī ḥammām	Shahi Hammam
Shāhjahān	Shah Jahan
Shaik ‘ali	Shaikh Ali
Shaikh muḥammad ghaus	Shaikh Muhammad Ghous
Shaikh sālim Chishtī	Shaikh Salim Chishti
Shalīmār	Shalimar
Shamas al - dīn iltutmish	Shamas ud din Iltutmish
Shāmianā	Shaimana
Shihāb al -dīn muḥammad	Shihab ud din Muhammad
Shīr shāh sūrī	Sher Shah Suri
Shīrāz	Shiraz
Shīsha	Sheesha
Shujā-e-shah durrānī	Shaja e Shah Durrani
Sikāndar lodhī	Sikandar Lodhi
Sīkandarā	Sikandara
Sindhī	Sindhi
Sobhā	Sobha
Srīnagar	Sirinagar
Ṣubāḥ	Subah
Ṣūfī	Sufi

Şūfī sayyid muḥammad iṣḥāq gāzrūnī	Sufi syed Muhammad ishaq gazruni
Sulṭan alāuddīn <u>khilji</u>	Sultan Alauddin khilji
Sulṭan balbān	Sultan balban
Suryāvansha	Suryvansha
Taghlaq empire	Tughlaq empire
Tāj maḥal	Taj Mahal
Tārmashirin	Tarmashireen
Tatār <u>khān</u>	Tatar Khan
Thāri <u>bhābriān</u>	Thari Bhabrian
<u>Thattā</u>	Thatta
Timūr <u>khān</u>	Timur Khan
<u>Uch</u> <u>shārīf</u>	Uch Shareef
<u>Ulugh</u> <u>khān</u>	Ulugh khan
Umār <u>khān</u> sarwānī	Umar Khan Sarwaani
<u>Ustād</u> <u>ahmad</u> <u>lahorī</u>	Ustab Ahamad Lahori
<u>Ustād</u> mansūr <u>naqqāsh</u>	Ustad Mansur Naqqash
Wāihind	Waihind
Wazīr <u>ghāzī</u> imād-al-mulk	Wazir Ghazi Imad ud malik
Wāzīr <u>khān</u>	Wazir Khan
<u>Zakāriyya</u> <u>khān</u>	Zakariya Khan
Zamān	Zaman
Zāmānī	Zamani
Zenānī dyodhī	Zenani Dhyodhi

Glossary

Ḥavelī	A Ḥavelī is a traditional townhouse, mansion, manor house, palace or fort in the Indian subcontinent, usually one with historical and architectural significance
Bāzār	A Bāzār or souk is a permanently enclosed marketplace or street where goods and services are exchanged or sold.
<u>Khatt</u>-Naskh	<u>Khatt</u> -naskh is one of the first scripts of Islamic calligraphy to develop, commonly used in writing administrative documents and for transcribing books, including the Qur'an, because of its easy legibility
Ḥammam	A ham Ḥammam is a type of bath or a place of public bathing associated with the Islamic world.
Sarā'ī	Sarā'ī (resting place) or caravansary, a caravan station where travellers would rest
Khāwabgāh	It is a Royal Bedroom associated with the Muslim world.
Nastālīq	Nastālīq is one of the main calligraphic hands used in writing the Persian alphabet and the Urdu alphabet, and traditionally the predominant style in Persian calligraphy.
Kūf īc, Naskh	A Naskh script associated with Kufa (Iraq)
Tāzākārī	Incised faux brickwork
Ā'inākārī	Mirror mosaic work
Jālī	Fretwork
Maḥal	Palace
Purānas	Ancient Hindu Text
Asthan	A place
Hudūd-al-^cĀlam	The Hudūd al- ^c Ālam is a 10th-century geography book written in Persian by an unknown author from Guzman
<u>Khurāsān</u>	<u>Khurāsān</u> , sometimes called Greater <u>Khurāsān</u> , is a historical region which formed the northeast province of Greater Iran
Qaṣbah	The meaning of the word kasbah is varied, including "keep," "old city," and "watchtower" or "blockhouse."
Qilā'	A fort
Nāg	A Cobra Snake
<u>Shāmianā</u>	A shamiana is an Indian ceremonial tent, shelter, or awning, commonly used for outdoor parties, weddings, feasts, etc. Its side walls are removable.
Dargāh	A dargāh is a shrine built over the grave of a revered religious figure, often a Sufi saint or dervish.
Chatrīs	An Umbrella
Srīwasta	"beloved of Sri," the goddess Lakshmi. It is a mark on the chest of Vishnu where his consort Lakshmi resides
Baoli	A stepped well
Guldasta	A decorative spire
<u>Bāgh</u>	A Garden
Nihār	A Canal
Pathar	A Stone
<u>Ghālibkārī</u>	A network of ribs in stucco and plaster is applied to curved surfaces in each archway.

Guzargāh	A royal passage
Kashīkāri	Glazed tile work
Sūfī	A religious saint
Pishṭāq	a rectangular frame around an arched opening, usually associated with an iwan.
Bihisht	Paradise
Hīra	Diamond
Achmenian	Ancient Persians
Qalibkāri	Mosquito-netting
Mīhrāb	a semicircular niche in the wall of a mosque that indicates the qibla, that is, the direction of the Kaaba in Mecca and hence the direction that Muslims should face when praying
Shīsha	A Mirror
Stupa	A Buddhist Burial Mound
Parchīnkāri	Pieta-dura
Arabesque	The arabesque is a form of artistic decoration consisting of "surface decorations based on rhythmic linear patterns of scrolling and interlacing foliage, tendrils" or plain lines, often combined with other elements.
Khatam sāzi	Ancient Persian technique of inlaying
Motī	A pearl

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