

The functional values of glass at the organic architecture

“Studying models of Frank Lloyd Wright works”

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Introduction:

Organic architecture is one of the most significant directions of architectural design at the 20th century. It was the architect Frank Lloyd Wright who set its principals, He was selected among the most important influencers at the 20th century architecture designers due to what he has presented in developing the principals of architectural design. He was characterized by his ability to use glass with multiple technics. The variations at his architectural works provided models that show the potentials of functioning glass in architecture that the glass designers could benefit from to activate the role of glass in architecture.

Point of research:

The world need for energy increases everyday under the pressure of the rapid increase in population and the living standard. On the other hand, there is a growing direction to look for sustainable energy resources that are non-pollutant to the environment. Glass is considered one of the important solutions at this field as using it in architecture allows the benefit of natural lighting in addition to being non-pollutant material. Providing functional and technical information about architectural glass contributes greatly in using glass in designing formulas that satisfy the physical and beneficial human needs.

Research goal:

Revealing the functional values of glass in organic architecture.

Preface:

Though Wright wasn't the first one to use glass in architecture but he was known for his use for various technics and distinguished designs that show the functional values of glass in architecture.

1- Windows and walls:

Wright relied on the idea of using long windows at many of his works. He used glass sheets with large areas that include the whole external walls (fig.no.4). He used leaded glass with geometrical designs at many villas. He didn't depend on ornaments and colors to benefit from natural lighting (fig.no.1). At other works he used colors at the upper part of the window to control light without needing shading devices (fig.no.2). In facades that aren't surrounded by gardens, he used regular windows at the top of the wall to provide privacy. He also used them at “Guggenheim Museum” to benefit from natural lighting maintaining the availability of show areas and spaces (fig.no.5).

Wright created the idea of using glass pipes in the walls of “Johnson company” buildings where they were beneficial in light distribution and realizing some rate of thermal isolation (fig.no.3).

2- Ceilings and the skylights:

Wright used leaded glass at the ceilings of villas, hotels and churches as light units to achieve the functional target and design integration (fig.no.1). At the “Unity Temple” he used leaded glass to receive natural light through the ceiling (fig.no.10).

At the work hall at “Johnson Company”, he used glass sheets in the ceiling as the files shelves prohibited the light receiving through the walls (fig.no.9). At “Larkin building”, Wright used glass tiles to execute the closed skylight, where glass was beneficial in providing natural lighting at the employees’ hall, stairs and corridors. At the same time for the isolation of the building from the external environment so he was the first building to be completely air conditioned (fig.no.6).

Wright also used glass to create domes and arch ceilings. They were beneficial at receiving higher lighting rates. He built a dome out of flat glass to lighten up the spiral show halls in “Guggenheim Museum” (Fig.no.5), and in “Johnson company” buildings he used glass pipes to create a dome in the reception hall (fig.no.8) and to cover the corridors among the buildings (fig.no.7).

3- The psychological aspects:

Wright used glass to realize psychological functions especially at churches. In the “Unity Temple” he used leaded glass at small windows in the top of the walls and in holes in the ceilings (fig.no.10). It is noticeable the use of large areas with dark colors in those holes, that’s how he could benefit from natural lighting with rates that could realize an atmosphere of submission.

In “Florida university church” he used colored glass to attract the attention of the attendees for the stand of the preacher (fig.no.11).

At the main hall of the Peace Temple he used colored glass in a formation that looked like an arrow hanged on the ceiling that points at the stand (fig.no.12).

4- The glass role in architectural design:

Wright could implement glass to play its role in the architectural form where the glass domes represent an element of formation to construct the building from outside like “Guggenheim Museum” (fig.no. 5). While the “Peace Temple” that takes the shape of “Noah ship”, we see a huge geometrical glass dome that takes the shape of a sail.

5- Results and recommendations:

Through this research the following results are achieved:

- a- Glass was a basic material at wright’s works; he managed to exploit natural lighting through it.
- b- Wright used glass with several technics in his works (sheets- leaded glass-glass tiles-glass pipes).
- c- Wright managed to control the rates of interior natural lighting of the buildings using the appropriate designs of colored glass or leaded glass.
- d- Multiple technics could be used that allow good distribution of the light inside the architectural space.

Recommendations:

- a- The attention to study glass role in Wright's works as he presents several models that help in benefiting from natural lighting especially at sunny countries.
- b- Studying the functional values in dovetailed glass designs.
- c- Caring about the color as a functional influencer in designing leaded glass works.
- d- Raise awareness among glass designers about the functional values of the different techniques of architectural glass.

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