

# The Advantage of Shades And Louvers in the Buildings

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## **Abstract:**

Glass facades in modern architecture are crucial for creating a visual connection between the inside and outside of a building. However, in hot regions, such as Arab countries, buildings exposed to sunlight and high heat can cause discomfort for users and impact economic, environmental, and social aspects. This study aims to address the suffering of buildings in hot regions by focusing on the facades of high-rise buildings and the importance of louvers in maintaining their aesthetic and functional aspects. It also discusses the use of louvers in modern buildings in Kuwait, highlighting the importance of incorporating louvers in the design process. The research concludes with recommendations to use louvers for their aesthetic impact and to improve indoor functionality, such as reducing heat entering buildings and reducing energy waste for cooling.

## Introduction:

A facade, derived from the French word 'façade', is the front part or exterior of a building and is crucial for its design and energy efficiency. Local regulations often restrict or forbid alteration of historical facades. Sun control and shading can significantly reduce heat and cooling requirements, improve natural lighting quality, and enhance user visual comfort by controlling glare and reducing contrast ratios. This can lead to improved satisfaction and productivity. Louvers can also differentiate building facades, providing a unique design that caters to different interests and human interests. Overall, well-designed facades can significantly enhance the overall aesthetic appeal and functionality of a building.



Different type of louvers

## **The purpose of the study:**

The study reveals that research on Vertical Glazing Systems (VGS) is primarily concentrated in Europe and Asia, with some aspects needing further investigation. The review also highlights the importance of considering factors such as species suitability for each climate, energy savings, façade orientation, foliage thickness, air layers, and substrate layer composition in green walls. Another study investigates the use of origami louvers in designing active solar façades in energy-efficient buildings. The paper presents a mechanical study on the dynamic response of shading screens formed by origami panels activated through tensioning and relaxation of selected strings. The study uses a numerical procedure to simulate the responses of these louvers under arbitrary loading, considering the incitation movement and vibrations under wind forces. The study also compares the unique ability of tensegrity shading systems to harvest mechanical energy stored in the strings with photovoltaic panels and micro-Eolic turbines. In recent years, there has been an increase in the variety of louvers and glazing available for use in buildings. However, their usefulness is limited by the separation and specification of all glass, including U-value, SC, and net window U-value. The shading coefficient (SC) indicates the sum of sun-powered warm gain in a building relative to single-glazed reference glass, while the visible transmittance indicates the percentage of light available in the visible portion of the spectrum. When designing louvers, it is crucial to evaluate maintenance operations and safety implications, considering potential risks like nesting birds or earthquakes in specific areas.

## **How is the Facade of High Rise Buildings .:**

High-rise buildings often use outside dividers suspended from concrete floor slabs, such as window ornament dividers and precast concrete walls. The facade or front side may need a fire-resistance rating, especially if two buildings are close together. Facade systems are typically made from aluminum or stainless steel, with titanium sometimes used but not popular due to cost and edge staining issues. Fire protection is a major concern in design considerations, with aluminum having a melting point of 660°C, which is typically reached within minutes of a fire. Placing fire sprinkler systems on each floor improves fire security in buildings with curtain walls. Unused materials like polymers have been used in high-rise building exterior fires due to their combustibility. Some building architectures limit the percentage of window area in exterior walls, as seen in the Georgian period. Louvers were introduced in the medieval and modern eras to add beauty and dimension to a building's flat surface. Sunshades have become an essential element in upgrading a building's look and sustainability.

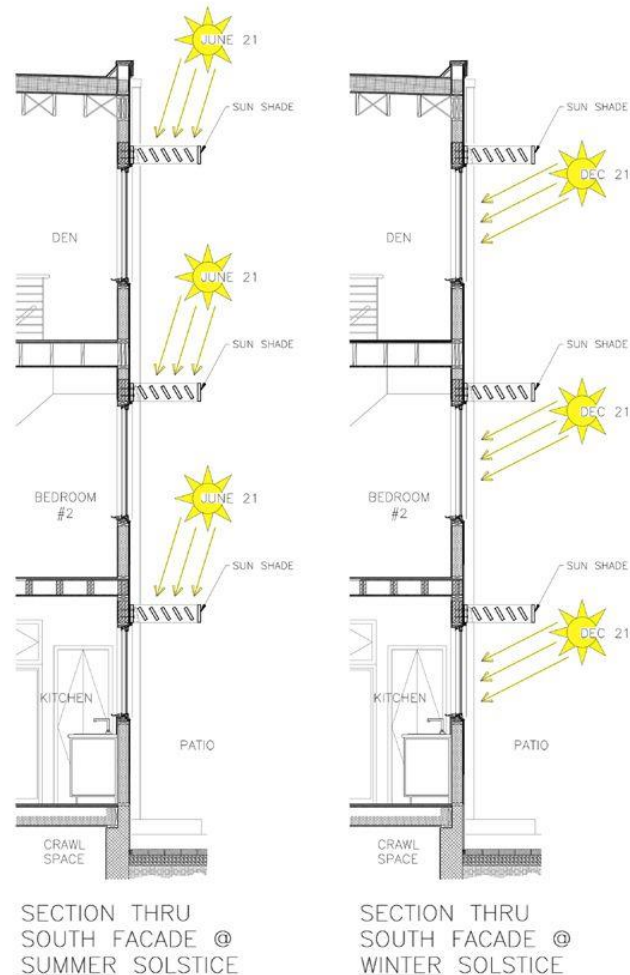
## **Louvers and how they work**

Louver panels are used to shield buildings from sunlight, providing a shield against UV rays and ensuring cooling during hot months. They are applied on both the external and internal parts of a building, with sun screening systems ensuring light passes through slits. Louver panels also have an aesthetic and architectural role due to their variety of shapes, colors, and materials, allowing them to harmoniously fit the building's facade..

## Benefits of Louvers in Building Façade

Louvers play a crucial role in improving energy efficiency in buildings by blocking direct sunlight from entering through windows or doors, regulating the building's temperature, and lowering air conditioning costs. Metal is an ideal material for perforated louvers and sunshades due to its flexibility, durability, and accessibility in various colors. Customized louvers and sunshades can create unique looks for buildings, providing













vertical setups for structural unique features. The perforation pattern, hole sizes, and shapes allow control over privacy and light infiltration, lowering energy costs, reducing glare and heat from the sun, and allowing natural light to illuminate the interior. This enhances the aesthetic appearance of the building, The design of louvers is challenging to generalize due to the diverse buildings and climates they exist in. However, certain design recommendations are necessary to ensure louvers are viable and sufficient sunlight is allowed in.



## Whats to be considered when we desgin Facades and louvers :

- Limit east and west glass to prevent blocking sunlight, and consider using landscaping to shade these exposures to maximize their effectiveness
- In continental latitudes, there's no need to fix or shade the north side glass due to limited direct solar rays. In the tropics, the north side receives more direct sunlight, and even without skylights, the roof should be considered for shading, as it's a major source of sunrays and heat. The simultaneous consideration of shading and daylighting is necessary due to their impact on each other..
- Interior shadings like Venetian blinds or vertical curtains may not work in both directions if there is enough louver and sunlight. However, they offer glare control and contribute to visual comfort within buildings.

- To install louvers, it's crucial to study sun angles, as it's essential for design decisions such as building orientations, louver selection, and placement of Building Integrated Photovoltaic panels or sunlight collectors.

	3-D View	Section Plan	Ideal orientation	View restriction
Horizontal single blade			South	★★★★
Outrigger system			South	★★★★
Horizontal multiple blades			South	★★★★
Vertical fin			East/West	★★★★
Slanted Vertical fin			East/West	★★★★
Eggcrate			East/West	★★★★

- The durability of operable shading materials necessitates careful consideration, as they often require regular maintenance and repair over time.

- When using landscape elements for shading, it's crucial to consider the cost of maintenance and upkeep on the life-cycle cost.
- The application of shading strategies at different latitudes may vary, as they may be inappropriate for different sites due to factors such as location, height, site orientation, building materials, and design.

## **Advantage of louvers**

Outdoor sunshades are ideal solutions for buildings with large windows and glazing to protect them from direct sunlight and overheating. These screens combine light intensity with shelter from the hottest rays, providing a fresh environment without sacrificing the brightness of large windows. External louvers, used in architecture for their elegance, cool and protect structures from solar radiation without causing a greenhouse effect. Outdoor sunshades are designed to shield sunlight without removing air from the building.

Among its several advantages of using louver panel, some are:

- protection from sunlight
- natural buildings cooling
- energy savings as it reduces the use of air conditioners or fans
- Possibility of mounting photovoltaic panels on it.

Also Outdoor aluminum louvers serve as a crucial winter protection mechanism, providing insulation from atmospheric pollutants and dust particles, thereby preventing wind and rain



## **Examples applications :**

hot weather often leads to high temperatures, particularly in houses with large windows. Architects and interior designers have created unique designs using louvers to avoid high temperatures, light glare, and privacy. These louver designs are found in residential and government buildings, ensuring a comfortable living environment for homeowners.

air common spaces. The design characterizes the edge of the piece and open spaces within the plot for the community, with different uses. The building cantilevers off the ground to draw street life into the building, with the ground floor level opening to the neighborhood with accessible retail facilities. The development consists of 16 living typologies, ranging from two-room to four-room duplexes, conveyed over five centers to cater to various tenants. The development includes gardens, exercise centers, pools, kids' playing ranges, squash courts, open patios, and community multi-purpose space.

## **Kuwait Children's Hospital**

The world's largest hospital is a five-story podium with Accident and Emergency, Diagnostic and Treatment spaces, a unique entrance and atria space with sea creatures, a twelve-storey tower, a helipad at roof level, a three-storey basement for support services, and car parking. The project is being overseen locally by SSH, providing support to ministries. The partners and project team collaborate on key plan choices, meeting the needs of MPW and the Ministry of Health. The louver façade reduces glare and discomfort, while also providing a unique modern shape..



Kuwait Children's Hospital

## General Secretariat for Council of Ministers in Baghdad

The project's goal is to construct a circular podium building and twin towers with 12 stories each, which will stand for Iraqi unity, civilization, and the birth of democracy. The project, which represents these values and houses the twenty-three divisions of the GSCM, was chosen as the winner of an international design competition in 2012. The design incorporates sustainable elements such as wind towers and facade treatments. Additionally reducing the heat and sun's harmful effects from Baghdad's hot weather by employing Mesopotamian items as sunscreen and louvers.



### Summery of the samples :

- The buildings discussed above offer an outside view and heat control through the use of louvers in their facades.
- The latticed louver size is suitable for Kuwait's climate, preventing significant glare and heat penetration into buildings like Kuwait University and Children's Hospital.
- The focus is on designing building facades as both aesthetic and functional elements to enhance the comfort and convenience living..
- These designs promote the use of daylight and reduce the use of artificial lighting..

## Conclusion

Sun control and louver devices are crucial in energy-efficient building design strategies, particularly for passive solar heating or daylighting. They can be used to prevent unwanted heat from entering conditioned spaces during cooling seasons, and can be achieved through common arrangements or building components like overhangs, overhangs, and trellises. Some louvers can also function as reflectors, called light shelves, which bounce natural light into building interiors. The design of effective louvers depends on the solar orientation of a particular building facade. Exterior louvers are particularly effective when combined with clear glass facades, but high-performance glazing with low shading coefficients can reduce the need for exterior louvers. Louvers have numerous positive effects at social, economic, and environmental levels. At the social level, they help diminish social screening and stabilize populations, while at the economic level, they contribute to real estate value, attract investments, and revitalize sectors. At the environmental level, they contribute to land sustainability, reduce consumption of new lands, and correct existing visual pollution. Louvers also create a suitable environment for interior design, even in buildings with vast glass facades, by reducing the amount of light entering the building and providing privacy for users. They also filter and reduce the amount of light entering the building.

