Daylighting with Energy-efficient Window Louver System for Passive Lighting
Technology #14541

Applications

This Louver system serves as a daylighting solution for deep plan building spaces such as offices, public buildings, and schools by creating a passive solution for diffusing direct light and managing glare. Architects and interior designers would benefit from this technology.

Problem Addressed

This louvered daylighting system has many advantages over existing passive lighting technologies. Other existing louver systems require additional shading devices to reduce glare, are not very effective under cloudy conditions, and have many exposed moving parts that require maintenance. Glare is a common problem with most louvered systems because the incoming sunlight reflects off of each louver. As a result, most louvered daylighting systems use a separate shading system to block or redirect the light and reduce the glare risk for those facing the window. To avoid needing a shade, this daylighting system ensures that no light is redirected downwards (from the upper part of the window) i.e. towards occupant’s eyes. In addition, a series of acrylic or glass rods is incorporated that scatter light and distribute it more broadly, which avoid collimated sunbeams to enter the room. Finally, the reflective ceiling is textured so as to reduce luminance and minimize glare risks from the ceiling itself.

Technology

This daylighting solution is a window louver system that provides low-glare passive daylighting to occupants of office buildings and other commercial deep-plan building spaces. The window louver system is enclosed within a separate window section that is mounted above the normal viewing window. This creates a simple, maintenance-free passive lighting system for daylighting in both sunny and cloudy conditions. This passive daylighting system consists of a series of horizontal reflective louvers and a row of vertical refractive rods that are encased between two panes of window glass. This louvered window is built into the upper-part (e.g. one-fourth) of a conventional window opening, still allowing occupants an unrestricted view out the lower window section. With this upper louvered window in place, daylight from all angles above the horizon is directed into the room - first upwards from the reflective louvers then spread horizontally after being refracted through the rods and is finally directed toward the ceiling where both direct and diffuse sunlight arrive at a strip of textured reflective panels. The panels help direct light to the back of the room while their texture contributes to reducing glare from the ceiling.

Advantages

- No additional shade system is needed to control glare
- Depth of illumination and glare control is better than with an uncovered window
- Louvers and rods are sealed between glass panes, reducing risk of damage
Having no exposed or moving parts reduces maintenance and cleaning expense
With no moving parts, is less expensive to produce than active systems
Produces less glare than other passive systems
Outperforms four other passive daylighting systems in terms of amount of illumination, depth of illumination, and glare control

Categories For This Invention:

Energy
Energy Efficiency

Intellectual Property:
Passive louver-based daylighting system
Issued US Patent
8,824,051
A passive louver-based daylighting system
Issued US Patent
8,462,437

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Publications:
A Novel Louver System for Increasing Daylight Usage in Buildings
The Soralux Daylighting System: Passive Solar Illumination for Deep-Plan Building Spaces
MSc Thesis
2011
A Novel Louver System for Increasing Daylight Usage in Buildings,
PLEA 2011 - Architecture and Sustainable Development, Louvain-la-Neuve, Belgium

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