Carrying Daylight Without Glare To Rear Interior Spaces

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Abstract :
The subject of this paper is adopting an active, and cheap interior design process that uses the sun, our natural free resource to flux through window to obtain a successful and effective method which allows penetration of the natural light with reduced glare to the rear interior spaces. This helps in serving health and comfort of occupant, increase productivity and decrease both electric energy consumption and electromagnetic pollution. The quantitpy and quality of sun-rays fluxing through the window is characterized by variability according to orientation and seasons which in turn leads to variability in the profile angle of sun-rays (the angle between the sun-ray and the vertical axis). The process considered in this paper depends on two steps: first step, is reflecting and collecting the fluxing sun-rays through window towards a concave wall-ceiling area (the concave area covering the intersection line of the ceiling and the window wall) by using a window reflector panes system. Second step, is transporting the sun-rays from the concave wall-ceiling area to the rear interior space by successive reflections of sun-rays through interior ceiling tubes beside each other lie inside the hollow space between upper and lower double surfaces ceiling. Each ceiling tube is covered internally by specular reflective material and consists of three successive essential parts: the **collector**, which is the first part in the ceiling tube, part of the concave wall-ceiling area, that reflects sun–rays to the **transporter**, the middle part of the ceiling tube, that transports sunrays by successive reflection to a concave shape **distributor**, the last part in the ceiling tube which reflects sun rays downwards to the rear space. The process is based on two new ideas: the first idea, is applying a mathematical relationships between the pane inclination angle (the angle between the reflector pane and the horizontal axis) and the sun profile angle. This relationship is used to obtain the optimum concave wall-ceiling area(collector), the optimum length between any two successive window panes and the optimum number of panes used to cover the window area, to provide the maximum quantity of daylight to the rear interior space. The second idea is an interior design management for the ceiling shape which play an essential role for placing ceiling tubes and for facilitating the reflection of daylight inside the ceiling light tubes. The method consists of three stages: First stage is the interior manipulation for designing the shape of the ceiling. Second stage is reflecting daylight from window to concave wall-ceiling collector. Third stage ,is reflecting daylight from concave wall-ceiling collector to the rear interior space.

Keywords:
illumination, glare, daylight, collector, transporter, distributor, inclination angle, profile angle, incidence angle, reflective angle .