

Building façade design for daylighting quality in typical government office building

Abstract:

Daylighting is one of the potential passive strategies to improve energy performance and users' visual comfort in existing offices without expensive installation and operational cost. For the first time, empirical study of daylighting performance was conducted for an existing typical government office building designed by Public Work Department (PWD) in Malaysia. Daylight field measurement of external illuminance and internal work plane illuminance was carried out. The findings demonstrated that internal daylight level in the building was insufficient despite the abundance of external daylight availability in the tropics which can achieve as high as 130 klx. Validation of simulation using Radiance-based software against the measurement under actual tropical sky indicated significant Pearson correlation of 0.709. Then, modification of window glazing and shading devices was experimented with simulation. The findings evidenced that light shelf increased daylight distribution uniformity, but failed to reduce glare on vertical plane when direct sunlight patches occurred. Integration of light shelf with partial blinds tilted at 45° showed improved performances of mean Guth Visual Comfort Probability (VCP) and CIE Glare Index. This paper concludes that simple modification of window glazing and shading device is able to provide significant improvement in tropical daylighting quantity and quality for visual comfort.