

A Biophilic Approach for Optimizing Daylighting Performance and Views-Out in Intensive Care Units Using Combined Light Shelf

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Abstract

The application of biophilic design metrics in healthcare has positive impact on enhancing users' health and emotional wellbeing. Where, biophilic design elements especially daylighting and the views-out accelerate patients' recovery, decrease patients', family and staff stress and depression, and also increase patients' wellbeing (Watts, 2017). So, these metrics should be considered from the beginning in the design of intensive care units (ICUs), to promote patients' and staff's mood and health (Victoria. Department of Human Services). This research aims at identifying the optimum design of parametric combined light shelf that will be installed over ICU patient room southern oriented window, located in Cairo, Egypt, considering the two biophilic design metrics performances, which are daylighting and the views-out. The main goal was to ensure adequate daylighting performance without discomfort glare inside the room, while maintaining patients' optimum upper vertical visual angle (in seating and sleeping positions) of the case study window unobstructed views-out. Parametric modelling and daylighting simulation runs were performed using Grasshopper software, Diva plug-in for Grasshopper modeling software to interface with the simulation engines Radiance and Daysim software. Multi objective optimization was performed via Octopus plugin for Grasshopper. The generations of solutions formed in Octopus were studied one by one to clarify by how much there is development in optimization process and when the optimization is ended. In general most of the light shelf design variables have achieved the sDA objective (sDA value greater than or equal to 75%) and 3" objective * 3"cping"dg"kp"vjg"tcpig"qh"407Å"/"72Å+. "htq o "vjg"dg ikppki"qh"vjg" optimization process, but without achieving ASE objective to be less than or equal to 10%, till the light shelf internal and external depths exceed 1m and its upward tilt angle seeks horizontality.

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