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Design

Goia et al (2013) developed a process by which theIntegrated thermal-daylighting simulations on a low energy building wereperformed.

The aim of this work was to find the Optimal WWR of the facade thatminimizes the total energy demand in a temperate oceanic climate. The resultsshow that, regardless of the orientations and of the facade area of thebuilding, the optimal configuration is achieved when the transparent percentageis between 35% and 45% of the total facade module area. In this range, daylighting conditions are also satisfactory and this WWR can therefore beconsidered a good starting point in preliminary design phase. The analyses showlittle dependence of Etot (WWR) on the building geometry and theHVAC efficiency. Lim et al (2012) presented a study of daylightingperformance for an existing office building which demonstrates that simplemodification of the external shading device and glazing type could providesignificant improvement in the indoor daylight quantityand quality.

This paper focuses only on thedaylighting performance for visual comfort and the author states that furtherresearch is needed on the thermal performance of the proposed modification ofbuilding façade as tropical daylighting is always associated with intensivesolar heat gain. As architectural design influencesthe energy demand of a building for heating, cooling and lighting, so optimumvalue for each of the considered parameters should be based on these threecases. If a building optimization is performed just by taking one of the threecases, the result would be likely concluded the increase in two other cases. There is therefore theneed to use some form ofautomatic self-steering optimization algorithm that willexplore potentially

good solutions (Caldas and Norford 2002). Inthis work, we have used octopus, a plug-in developed for grasshopper, which canbe used to explore large search spaces and objective functions with multiplelocal optima. The aim of this paper is to demonstrate that theoptimization of a facade requires the contemporary evaluation of EH, EC, andEL, and that integrated thermal and daylighting simulations are essential.