

## USE OF KINETIC FACADES TO ENHANCE DAYLIGHT PERFORMANCE IN OFFICE BUILDINGS WITH EMPHASIS ON EGYPT CLIMATE

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### Abstract

Daylight performance is an important factor in office building design. Kinetic facades are introduced for enhancing daylight performance. Parametric Daylight simulation was performed through Rhino software plug-ins Grasshopper and Diva with a Radiance interface to explore the applicability of parametric design in enhancing daylight performance. Two types of kinetic movements, rotation and vertical transition are applied on horizontal louvers of an office building's south façade. The aim is to evaluate the effect of louvers configuration to achieve a balance point between sufficient luminance 10 level and light uniformity in space, to determine the optimum hourly pattern for louvers movement.

The daylight simulation is performed on a virtual prototype of an office building with dimensions 4.0\*6.5\*3.0 m, in a desert hot arid climate, Cairo, Egypt. The study focused on three hours (8:00, 12:00 and 16:00) of three critical days in the year (21st of June, 21st December and 21st of March).

The proposed algorithm converts the luminance values of studied hours to a percentage format 15 showing day-lit, under-lit and over-lit zones. Results show that using well-studied kinetic louvers could increase the percentage of day-lit zone to 63%, while the percentage was 53% without shadings and 32% with an unstudied kinetic system.

**Keywords:** *Daylight performance; parametric daylight simulation; kinetic facades; daylight algorithms; simulation.*