

Abstract

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Life-Cycle Cost Assessment of Kinetic Aluminum Louvers – Office Buildings Facades in Egypt

Kinetic building skins have been developed worldwide during the past few decades in order to adapt building facades to weather conditions and reduce solar gain while maximizing daylight, leading to reduction in the building cooling loads. This research aims to study the value of kinetic aluminum louvers installed on office building facades in a hot-dry climate, such as that of Egypt, in comparison to fixed aluminum louvers and non-shaded cases in terms of energy consumption and building life-cycle cost. The research specifies the optimum shading scenario that reduces the building life-cycle cost while responding to human thermal comfort needs. These shading scenarios were simulated using dynamic thermal modeling and the simulation results were analyzed in terms of energy consumption and building life-cycle cost. The net savings potentials of using shading alternatives were compared, showing that kinetic aluminum louvers achieve lower operation cost in comparison to fixed aluminum louvers and non-shaded scenarios. However, the results show that the high initial cost of imported kinetic aluminum louvers in Egypt raises the life-cycle cost and expands the payback period in comparison to other shading scenarios. Further analysis proved that locally supplied aluminum louvers can achieve net savings over the non-shaded case.