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INVESTIGATION OF THE BUILDING PERFORMANCE WITH REFERENCE TO GLAZING PROPERTIES APPLICATION TO THE NEW PASSENGER TERMINAL BUILDING AT THE BANDARANAYAKE INTERNATIONAL AIRPORT, SRI LANKA

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Degree of Master of Engineering

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DECLARATION OF THE CANDIDATE AND SUPERVISOR

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ABSTRACT

This study is aimed to investigate the energy and thermal performances of the airport passenger terminal buildings in Sri Lanka that use different glazing alternatives. In this regard, one of the passenger terminal buildings at the Bandaranaike International Airport (BIA) was selected as the reference case.

Different glazing materials commercially available both in the local and overseas market were compared with a common glass material used in Sri Lanka as the base case to investigate the energy use and the thermal comfort conditions in the building. The computer software tool, DEROB-LTH (version 99.02) was used to evaluate the cooling energy use and thermal environment condition of the building. The cooling energy use was evaluated in terms of hourly, daily and monthly basis and the interior climate was evaluated in terms of the operative temperature.

The simulation results have shown a positive conclusion towards the feasibility of using double glazing units with advanced solar-control coatings and it further showed that the common glazing material used in the Sri Lankan building industry; the single-clear glazing is not feasible in terms of energy cost and indoor thermal performances. The study also supports that a single-pane heat-absorbing type solar-control configuration can give comparatively moderate results; better results than that for the single-clear glazing type in local climatic conditions.

Finally, an economic/cost-benefit analysis was performed in order to investigate the economic viability of applying the best performing, highly expensive, advanced solar-control glazing over the reference case; ordinary single-clear glazing, and it was found that this glazing is highly cost effective and worth paying for any orientation. However, it is noted that the initial capital cost of these advanced solar-control glass materials as well as the popularisation of this technology in the local scenario was identified as the major barrier for the development of this technology in Sri Lanka.

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