UNIVERSITI TEKNOLOGI MARA

THE DOCTORAL RESEARCH ABSTRACTS

Volume: 5, Issue 5 May 2014

FIFTH ISSUE

INSTITUTE of GRADUATE STUDIES

Leading You To Greater Heights, Degree by Degree

IPSis Biannual Publication

4

Name :
Noraini Bt Ahmad

Title
Control Of Daylight And Artefacts Display And Placement In Historic Museum Galleries

Faculty :
Architecture, Planning & Surveying

Supervisor :
Associate Prof. Dr. Sabarinah Bt Sheikh Ahmad (MS)

Associate Prof. Dr. Anuar Bin Talib (CS)

Daylighting in historic museum galleries is not an easy criterion to manage as natural light fluctuates according to the sky conditions; hence the need for strategic daylight control programme becomes evident. Currently, there is limited information on daylight performance for conservation of artefacts in daylit historic museums in Malaysia. This thesis aims to evaluate daylight performance for artefact conservation through passive design and control strategies in historic museums under the tropical sky conditions. This research focuses on evaluating the existing illuminance levels, UV levels, daylight factor, light-fastness survey and visitors' perception on the exhibits' conditions and their visual responses on the daylighting conditions. The performance of daylighting was evaluated based on typical

sidelighting configuration in four types of gallery: balcony, corridor, compartmental and open planning. The research was performed through three experiments; namely, *Phase I*: field measurements of the illumination and UV levels and Visitors' Survey; *Phase II*: light-fastness dosimeter exposures; and *Phase III*: computer simulation study. The results from *Experiment I* (field measurements) showed good correlation between the outdoor and the indoor displays' illuminance levels where the display placement and orientation of sensitive artefacts affected the daylight distribution pattern. Meanwhile, the visitors responded that the daylighting pattern affected the artefact conditions and their viewing satisfaction. The findings from *Experiment II* (light fastness dosimeter survey) revealed that after exposures of 90 to 100 days, the dosimeters showed photo-induced colour changes under both daylight and artificial light. Further analyses showed good correlation between simulated light dosimeters and measured illuminance data. Thus, an equivalent light dosimeter is a suitable tool to assess the impact of light distributions, which translated exposures into equivalent luminous and estimated annual exposures (Lux hours). The results from *Experiment III* revealed that computer simulated illuminance and measured illuminance data showed good correlation. The simulation analyses revealed both surface reflectance and ceiling geometry could act as a passive control mechanism with the physical features as a conservation criterion in the gallery. The thesis introduces the issues of daylight distributions, the placement of display components, the orientation of artefacts, light fading occurrences, the visitors' visual perception of the galleries and the function of daylight data towards artefact conservation planning. These measured components were extended into passive daylight control assessment through simulation studies. The study confirms the feasibility of retrofitting historical buildings into museum galleries as well as recommends strategies and best practices for proper building adaptation towards artefact conservation.