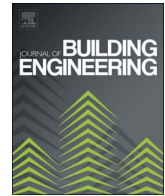




Contents lists available at [ScienceDirect](http://www.sciencedirect.com)

Journal of Building Engineering

journal homepage: www.elsevier.com/locate/jobee



Low cost humidity controlled air-conditioning system for building energy savings in tropical climate



Azizuddin Abd Aziz^{a,*}, Daisuke Sumiyoshi^b, Yasunori Akashi^c

^a Faculty of Mechanical Engineering, Universiti Malaysia Pahang, Malaysia

^b Department of Architecture, Faculty of Human - Environment Studies, Kyushu University, Japan

^c Department of Architecture, Graduate School of Engineering, The University of Tokyo, Japan

ARTICLE INFO

Keywords:

Tropical region
Indoor temperature and humidity
Thermal comfort
Latent heat
Air handling unit
Energy consumption

ABSTRACT

The viable solution to the high latent load that naturally occurs in tropical regions requires an alternative system that runs at relatively low energy consumption yet be able to provide indoor thermal comfort by effective handling of the excessive humidity. Although the existing outdoor air treatment system is a proven approach, it is unpopular in developing countries due to its high initial cost. In this paper, a new system termed Dual Air Handling Unit system is proposed to be the answer. The function of Humidity-control Air Handling Unit is to remove the moisture from the conditioned room up to the desired humidity level and in the process the room temperature is also fractionally reduced. The Temperature-control Air Handling Unit completes the task by removing the remaining sensible heat so that the room temperature is maintained at the required set-point. By reducing the relative humidity to 50%, a much lower value than that of the normal air-conditioning could offer, room temperature of the new system is shifted higher to 26 °C in order to reduce the energy consumption. The simulation result shows that the proposed system offers energy savings up to 13.2% compared to the conventional air-conditioning system, without compromising the thermal comfort of the occupants.