



**THE VENTILATION PERFORMANCE OF A SOLAR - POWERED ATTIC
FAN IN MALAYSIAN CLIMATE**

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ABSTRACT

Heat and moisture are claimed to be every attic's worst enemy. While many homes have small passive vents, most are ineffective in moving enough air to expel heat and moisture. A passive strategy such as a solar powered attic fan is claimed to be one of the ways that is able to solve the problem. The "run by the sun" system consists of lightweight fan blades which functions as air extractor and powered by PV panels A study was conducted to investigate the effectiveness of a ventilation system called Solar Star Roof Mount Vent, in providing thermal comfort to the interior space of a building. This solar-powered attic fan basically consists of lightweight fan blades powered by PV panels. This system is widely used in temperate climate countries to improve interior environments during daytime in the summer, as it is purely solar radiation dependent. The ventilator functions as a heat extractor, extracting out warm air trapped near the ceiling, and inducing fresh air in through openings in the attic. However no scientific measurement has been made to quantify the effectiveness of the system in providing indoor thermal comfort especially in tropical countries. Therefore, this study was conducted to investigate the performance of the system under Malaysian real sky conditions. The air temperature, relative humidity and air movement inside a room in which the ventilation system has been installed were monitored continuously over a certain period of time. Comparisons on the values of the temperature and the airspeed inside the occupied space were then made for cases with and without the ventilation system, giving an analysis of the overall performance and effectiveness of the system for hot and humid climates. The whole experiments were conducted in a test room under real-time dynamic climatic conditions at Block G, UiTM Shah Alam. This study is part of a research project to develop an integrated daylighting and natural

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CHAPTER I

INTRODUCTION

1.1 What is ventilation?

"Ventilate" comes from the Latin word for "to fan". Ventilation is the deliberate replacement of warm inside air with cooler outside air by utilising naturally-occurring air temperature and pressure differences, or by mechanical means such as exhaust fans. Ventilation can be defined simply as the process of removing polluted, stale, moisture laden indoor air and replacing it with fresh outdoor (often dryer) air. In other words, it is the process which fresh air is introduced and ventilated air is removed from an occupied space.^[1]

The primary aim of ventilation is to preserve the qualities of air. Sometimes, ventilation may also be used to lower the temperature inside an occupied area. Ventilation, at air speeds greater than that provided by natural air leakage, has a cooling effect on the human body. At air speeds of between 0.5 m/s to 1.0 m/s the body will feel 2–3°C cooler in 25°C air^[2]. The greater the extent of air-tightness to eliminate draughts and reduce energy costs, the more important it is to provide controlled ventilation to maintain adequate air quality, particularly in service areas such as kitchens and bathrooms.