

## **Optimization of temperature and relative humidity with maximum oxygen uptake (VO<sub>2</sub>max) and Heart Rate (HR) by Using Response Surface Methodology (RSM)**

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### **ABSTRACT**

The purpose of this study is to optimize the temperature and relative humidity (RH) conditions of the worker heat stress and human physiological performance namely as Maximum Oxygen Uptake (VO<sub>2</sub>max) and heart rate (HR) in the construction (outdoor environment) and manufacturing (indoor environment) environment. Heat stress assessment was conducted at the workplace with two parameters of heat and relative humidity for indoor and outdoor setting conditions. The response surface methodology (RSM) was utilized in this study to analyze the results and finally to optimization the relationship of both setting for indoor and outdoor. A total number of 26 experimental runs were carried out with three male of voluntary respondents. The experiments were conducted in a well design climatic chamber with capabilities to simulate the indoor, outdoor temperature and relative humidity parameter of environments. The analysis showed that, for the indoor activities the parameter of VO<sub>2</sub>max and heart rate, the temperature and relative humidity (RH) exposed to human body should be optimized at 24.2 °C and RH at 45.8%. Meanwhile, for the outdoor activities, the temperature and RH exposed to human body should be optimized at 24.6 °C and RH at 72.5%. Therefore, these findings are in line with the current setting of comfort under ICOP IAQ 2010, DOSH Malaysia.

### **KEYWORDS**

Thermal; Heat stress; Optimization; Outdoor; Indoor; Response surface; Comfort

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