

# Evaluation A Portable Air Circulation System-ACS For Increased IAQ

Bongkotmat Donsomphai<sup>1</sup>, Wipada Ruanchatchawan<sup>2</sup>, Jirod chaisan\*

<sup>1</sup>Demonstration school University of Phayao, University of Phayao  
Phayao, Thailand

<sup>1</sup>63341459@up.ac.th, <sup>2</sup>63341428@up.ac.th, \*jirodch@hotmail.com

## Extended Abstract

In the Present, the major problem in building establishment and small office are the issue of increasing temperatures that effect the thermal comfort trouble. Indoor air pollution was distributed by some office's equipment such as printers, inhalant from chemical pen etc. Unpleasant odors as well as problems with dust - smoke that found in buildings. Generally, people spend time more than 80% [1] of all activities inside the building like average approximately 6-8 hours for sleeping. So, in this research education about indoor air quality (IAQ) [2-5] topic is important. Including relates to the health of resident and controlling pollutant. This study supposes to use mechanical air purifier that was designed equipment by zigzag filter for small room conditions. The Air Circulation System (ACS) was assigned constant air flow. In the part of measuring such as Temperature, Relative humidity (Rh), Indoor air quality (IAQ 62.1), Carbon dioxide CO<sub>2</sub> (in the form of incense sticks) [6-8] were saved by monitoring control under carried out Arduino program. Pollution was produced during the experiment by burning incense sticks. Whereas incense divide 3 step variables for comparison and evaluation system. And reducing some particulate matter. During the time of the experiment, incense sticks were burned by a heat source after that the ambient temperature increased and contributed to the area. Including relative humidity, that significantly decreased because of heat form burning. Next, turn off the incense sticks affected to temperature reduction in the same relative humidity increased until to constant value or normal condition. Shown the temperature relative with relative humidity. High temperature outdoor air consisting of dust, smoke and PM was transferred to ACS after that outdoor air contributed high density of concentration inside. And concentration decreased by filter and exhaust by fan. Due to ACS purifier depend on amount of incense sticks. Result high concentration of smoke and dust spent time more than low concentration. That overall be up to several factors such as air flow velocity, air size space, and fan size. The average different temperature between in and out is around 0.865 °C and The total reduction of CO<sub>2</sub> can reduced as much as 10,000 ppm. for 3 minutes or around 55 pmm./ sec. However, this experimental conception of studied behaviour, modification, optimization and building of air circulation system for small office under commercial air purifier conditioner only.

**Keywords:** Air circulation, Incense sticks, Air pollution, ventilation system

## References

- [1] Hyungyu P, Seonghyun P, Janghoo S, "Evaluation on Air Purifier's Performance in Reducing the Concentration of Fine Particulate Matter for Occupants according to its Operation Methods" *International Journal of Environmental Research and Public Health*, vol.17, pp.5561, 2020
- [3] Woracha P, Karinrat S, Pakjira N, Nisarat P, Phopploy V, Onwara A, Artitaya K, Chulawadee S, Chawee B, Tipsuda J, Sudaporn S. "Study of PM2.5 flitering by using climbing plant attached to an architectute" *Built*, vol.15, pp.2238-9194, 2020.
- [2] Gowri R , Balaji P, Leela P C, Kamalesh R G K, Jenifer S, Monica K, Vinoth S. "Review on air purifier. GSC Biological and Pharmaceutical Sciences", vol.07 (01), pp.001-005, 2019.
- [4] Hazam B A. "Ventilation for good indoor air quality and energy efficiency" *Energy Procedia*, vol.112, pp.277-286, 2017.
- [5] Chunhui L, Li B, Zijian H, Xinru L, Xiuling X, "The effect of air purifiers on the reduction in indoor PM<sub>2.5</sub> concentrations and population health improvement" *sustainable Cities and Society*, vol.75, 2021.

- [6] Stuti D, Himanshi R, Ajay T, “Assessing effectiveness of air purifiers (HEPA) for controlling indoor particulate pollution” *Heliyon*, vol.7, 2021.
- [7] Youngtae C, Jun-shup S, Jinhyeon P, Eunchar K, Narae O, Kihong M, Dongjun K, Kyunghwa S, Mansu C, Wonho Y, “Inadequacy of air purifier for indoor air quality improvement in classrooms without external ventilation” *Building and Environment*, vol.207, 2022.
- [8] Elizabeth C, Yan W, Samuel S, Esfandiar B, Dejan M, “Use of portable air purifiers in homes: Operating behavior, effect on indoor PM2.5 and perceived indoor air quality” *Building and Environment*, vol.191, 2021.