

Methee Duangsoythong 2014: An Investigation on Open Area Ratio of Perforated Plate and air distribution for Raised Floor air Conditioning System. Master of Engineering (Mechanical Engineering), Major Field: Mechanical Engineering, Department of Mechanical Engineering. Thesis Advisor: Associate Professor Chawalit Kittichaikarn, Ph.D. 79 pages.

This research presents an investigation on a correlation of open area ratio of perforated plate and air distribution for the raised floor air conditioning systems. The commercial software in Computational Fluid Dynamics (CFD) was used to analyze the air flow through perforated plate after the pressure loss coefficient is adjusted. Experiments were also carried out to validate these computational results. In this research, the model of raised floor room with a size of $80 \times 160 \times 20 \text{ m}^3$ was built. It has 2 rows of perforated plates and each row has 7 perforated plates installed on top. In addition, each perforated plate has an open area of 17.7% and $20 \times 20 \text{ cm}^2$ in size. The measurements of flow velocity through perforated plate were made due to 4 different inlet velocities. These measurements were used to adjust the open area ratio of the perforated plates so that they could give a uniform distribution of air flow across perforated plate.

From the results obtained, it was found that the air flow across each perforated plate were significantly different. The air flow rates from the perforated plates which are nearest and furthest from CRAC are higher than those in the middle by 30%. This problem could not be solved even though the inlet velocity of the air flow was increased. However by varying the open area ratio of each perforated plate, the flow rate of the air from the middle perforated plates could be increased. With this technique, the air flow rate from each perforated plate is different to the average value by only 10%. Therefore the correlation between open area ratio and air flow distribution obtained in this research could be used to improve the efficiency of the raised floor air conditioning system.

_____/_____/_____
Student's signature Thesis Advisor's signature