

Jetsadaporn Priyadumkol 2012: Application of the Combined Air-Conditioning Systems for Energy Conservation in Data Center. Master of Engineering (Mechanical Engineering), Major Field: Mechanical Engineering, Department of Mechanical Engineering. Thesis Advisor: Associate Professor Chawalit Kittichaikarn, Ph.D. 76 pages.

The power trend of using server systems in data centers is continuously increasing. As a result, the server racks remove a dissipation of heat. For this reason, a raised floor air conditioning system is used in data center cooling systems. This cooling system is important to keep the computer system operating to be effective and long lasting. Thus the proper design air conditioning system in data center is concerned in order to avoid disruption that caused by overheating. Today it is not only a raised-floor cooling system that has been used in data center but also a new cooling system called “In-row” has been introduced into the market. This research presents a simulation of cool air flow generated by these 2 different air conditioning systems in data center for giving some appropriate guidelines to help the designer to achieve a better and more efficient cooling system.

Commercial Computational Fluid Dynamics program (CFD) was used to analyze the airflow for data center cooling system. Measurements of air velocity and temperature were carried out in the data center to validate the simulation results. Afterward, the simulation of airflow in the data center using combination of raised floor and In-row air conditioning systems was simulated. As a result, dimensionless parameters in the form of supply heat index (SHI), heat load of server racks and the volume flow rate from perforated tile were carried out by considering the rack inlet temperature compare with the standard air temperature of ASHRAE. It shows that these parameters provide an effective tool to the improvement of energy efficiency in the raised floor data center.

Student's signature

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