SUMMARY

Many studies have been conducted in the area of indoor air quality (IAQ). The indoor air quality audit methodology has been developed in the last few years and implemented to IAQ audit of many commercial buildings in Singapore. Results of the study were used as database as well as to determine the possible causes of concern. However, this quantitative approach has its limitation especially for addressing the efficiency factors of design aspects in indoor environment. Moreover, the field measurement may not be implemented to all locations in a large-scale building, hence, with the advancement of computer simulation, fluid dynamics concept can be further employed to simulate the prediction of air flow in the space. Since air flow is one of the most significant factors to pollutant dispersion, the simulated results become critical to address many issues of IAQ condition. The numerically predicted results and its graphic presentation can be explored to provide acceptable solutions to any problems found.

This study is intended to integrate quantitative and qualitative approach is to address indoor air quality issues pertinent to commercial office building. It combines the methodology adopted for IAQ study and air flow simulation. It also addresses thermal comfort issues. In addition to indoor air assessment, volatile organic compounds, chemical substances that significantly affecting indoor air quality is also elaborated. Results obtained from the IAQ audit were further analyzed and findings were correlated qualitatively to the simulated air flow profile.

A commercial office building in the CBD area of Singapore was chosen for the study. Results show an acceptable level of indoor air pollution except for some biological pollutants and chemical compounds in some locations are higher compared to ambient condition. Prediction of air flow using CFD simulation depicts acceptable correlation to the measured condition. The air flow pattern explains the possible sources and pathways of pollutants. The existing condition of air supply system also have a tendency of short-circuiting. A suggested solution is simulation using another set of boundary conditions to provide a better air flow characteristic to the office space.