



Effect of Ventilation Design on Removal of Wood Dust Particles and Occupational Health in Buildings



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Pickard Hall, Room 487

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Abstract:

Wood dust is one of the most common organic dusts to which humans are exposed to due to the extensive use of wood for construction material and furniture. The International Agency for Research on Cancer estimated that at least two million people in the world are exposed to wood dust occupationally. Studies have found that exposure to wood dust can cause health effects from nasal mucosa damage, irritation and sino-nasal cancer to deep lung deposition leading to lung cancer and impaired respiratory function.

A fully integrated approach combining field and laboratory measurements with Computational Fluid Dynamics (CFD) techniques has been used to evaluate the deposition of particles in the human upper-airway including nasal cavity and lung airways and to investigate the effect of ventilation system design on removal of wood dust particles in manufacturing workshops. From these studies it was found that (i) the particle distribution pattern from a downstream point source is strongly dependent on the ventilation air supply rate and (ii) particle deposition and migration are mainly influenced by the particle properties, the ventilation conditions and airflow patterns. This talk presents the modelling capability of CFD to determine the best ventilation design from a group of selected designs.

Dr Jiyuan Tu is a Professor and the Deputy Head (Research) in School of Aerospace, Mechanical & Manufacturing Engineering at RMIT University, Australia. He has extensive research experience in Computational Fluid Dynamics (CFD) and its applications to a broad aspect of engineering including automotive, nuclear, defence, building, environmental and biomedical engineering. His research has been mainly supported by Australian Research Council (similar to NSF) through highly competitive research grant programs for over \$2 million in the last five years. He is a recipient of many prizes and prestigious fellowship awards including a 2008 Australian-American Fulbright Senior Scholar Award, Japan Society for the Promotion of Science Fellowship, and Korea Science and Engineering Foundation Fellowship and an RMIT University Teaching Award. He has over 200 refereed publications in areas of his expertise and published a textbook (2007) for undergraduate teaching in CFD by Elsevier (UK). He is the Editor of Journal of Computational Multiphase Flows published by Multi-Science Publisher (UK).

The Math Department will provide refreshments 30 min. prior to the presentation.