

Advanced air distribution: Improving health and comfort while reducing energy use - DTU Orbit (08/11/2017)

Advanced air distribution: Improving health and comfort while reducing energy use

Indoor environment affects the health, comfort, and performance of building occupants. The energy used for heating, cooling, ventilating, and air conditioning of buildings is substantial. Ventilation based on total volume air distribution in spaces is not always an efficient way to provide high-quality indoor environments at the same time as low-energy consumption. Advanced air distribution, designed to supply clean air where, when, and as much as needed, makes it possible to efficiently achieve thermal comfort, control exposure to contaminants, provide high-quality air for breathing and minimizing the risk of airborne cross-infection while reducing energy use. This study justifies the need for improving the present air distribution design in occupied spaces, and in general the need for a paradigm shift from the design of collective environments to the design of individually controlled environments. The focus is on advanced air distribution in spaces, its guiding principles and its advantages and disadvantages. Examples of advanced air distribution solutions in spaces for different use, such as offices, hospital rooms, vehicle compartments, are presented. The potential of advanced air distribution, and individually controlled macro-environment in general, for achieving shared values, that is, improved health, comfort, and performance, energy saving, reduction of healthcare costs and improved well-being is demonstrated. Performance criteria are defined and further research in the field is outlined.

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