

Energy-efficient improvement of thermal comfort at the workplace under summer conditions by integrating fans into acoustic panels

Air speeds can be individually adjusted with the help of workplace-related ceiling fans. In accordance with DIN EN ISO 7730, the temperature levels perceived as comfortable can be increased by up to 3 K. Against the background of increasing summer temperatures, this is particularly important for buildings with low cooling potentials, such as existing buildings and passively cooled buildings. Because the coupling of the thermal storage masses to the room air is usually associated with large sound-reflecting surfaces in passive cooled buildings, it is useful to integrate the ceiling fans into suspended acoustic panels.

Such a system was developed in a research project at the University of Wuppertal in collaboration with industrial partners. It is characterized by highly effective fans. In the meantime, 180 workplaces in an administration building in Dillingen a.d. Donau have been equipped with this system as part of a refurbishment project. The improvement of thermal comfort during the day is discussed on the basis of flow field measurements. In addition, the effectiveness of night ventilation with and without fan operation is evaluated experimentally. For this, summer measurements were carried out in a test room at the University of Wuppertal. The results show that the panel-integrated fans increase the convective heat transfer at the room surfaces and can therefore improve the night ventilation effectiveness.

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