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Hartley Henderson

BRINGING MICROCLIMATE CONTROL TO WORKSTATIONS

When it comes to heating and cooling preferences in offices, one or two 'thermostat tyrants' often control the temperature settings. HARTLEY HENDERSON investigates a better alternative: individually controlled microclimates.

In most traditional office buildings, centralised heating, ventilation and cooling (HVAC) systems are designed to satisfy the air circulation, heating and cooling needs for entire floors.

But there can be a variety of individual preferences for thermal comfort ranging from too hot to too cold. With traditional HVAC systems, the only way to alter the ambient air temperature of the office is to adjust the thermostat, which can result in 'thermostat wars' among employees, and become a significant issue for facility managers.

So what can be done to provide a personal ventilation system that can be controlled by individual employees at their own workstation?

Task Air is a new system that ducts a percentage of the building's conditioned air, generally around 20 percent, down a blade to the workstation screen.

The flexible duct in the ceiling is connected to the blade via a cushion head, which sits above the blade in the ceiling. A dampener is located in the cushion head to allow control of air volumes to each blade of the Task Air system.

Conditioned air is delivered through a diffuser to the workstation, where the user can adjust a personal diffuser to control the airflow at their desk, similar to the personal ventilation diffusers in an aircraft or motor vehicle. The balance of the conditioned air (80 percent) continues to be delivered through the conventional ceiling diffuser.

Rob Lord, managing director of Seed Engineering, who has been involved in the development and marketing of Task Air, says the system uses the workstation to deliver conditioned air in a manner that permits adjustable direction and volume.

"People have a wide variety of preferences for their thermal environment, which is subject to factors such as clothing and fitness levels, and these 'non-technical' aspects of thermal comfort create challenges for the HVAC plant to provide a space with no complaints," he says.

"In a single temperature environment, such as open plan offices, the goal of accommodating the differences in people's preferences may be achieved most effectively through provision of adjustable air movement.

"While open plan provides flexibility and good use of space, there are down sides that affect air quality. The 'one temperature suits all' scenario is far from desirable and causes workers much discomfort.

"Ceiling-delivered air that randomly mixes with previously exhaled air greatly increases the risk of sharing airborne illnesses, including respiratory diseases, which are often the cause of short-term absences. There is a strong relationship between the provision of good air quality and productivity improvement.

"Task Air overcomes all these deficiencies and allows the best air quality to be delivered directly to the breathing zone.

"Studies suggest that giving people control will improve productivity anywhere up to six percent, and bringing fresh air much closer to people will further improve productivity by up to four percent."

Task Air can also assist in energy savings. Because the Task Air method delivers the air directly to the users, chilling temperatures can be turned down. Energy savings are in direct proportion to the extent to which the HVAC engineer can turn down the HVAC system.



"Studies suggest that people control will improve productivity anywhere up to six percent, and bringing fresh air much closer to people will further improve productivity by up to four percent."
—Rob Lord, Seed Engineering

left: Conventional air-conditioning connects to the Task Air workstation via a conventional cushion head.

below: Privately adjustable heating and cooling vents close to where workers are seated is highly efficient, as less energy is wasted heating or cooling ambient air.



"Task Air allows the microclimate ducting to be created with negligible additional material, and therefore negligible additional cost, and the system has the same connection to the HVAC system as a relocatable diffuser and is so very easy to fit," Lord explains.

SIGNIFICANT IMPACT

Task Air is available in Australia from UCI, which can incorporate the system into its range of demountable workstation designs.

Company director, Nick Scriggins, says the system's simple change of delivery point of the conditioned air has a significant impact on an open plan

office. "Open plan layout is widely used in modern office design and often results in high-density occupancy levels which bring about occupant dissatisfaction with thermal comfort and air quality," he says.

"With Task Air, the mechanical engineer is provided with a new tool with which to manage the difficult task of delivering the best air quality in the most energy efficient manner.

"Removing and reconfiguring Task Air is easily achieved if the layout of workstations in an office needs to be changed. The workstation is simply dismantled and relocated, and the flexible duct is reconnected to the new location."

RESEARCH

Dr Scott Drake at The University of Melbourne has undertaken research into the impact and effectiveness of personal ventilation systems, including Task Air, as an alternative to traditional air-conditioning systems.

He says the unique aspect of the Task Air system is that it is integrated into an office workstation, using the panels of the workstation as a duct for delivering air to the occupants.

"The name Task Air is derived from its similarity to task lighting, where low-level background lighting is complemented by user-controlled desk lamps to provide higher lighting levels as and where

needed. Similarly, Task Air delivers air directly to workstations, complemented by background air delivery for circulation and common spaces," he says.

"By delivering air only to where the occupants are, there is potential system efficiency over traditional systems that deliver air to all parts of the space.

"The supply of clean air near to the breathing zone has the potential to improve inhaled air quality, which in turn may help to improve worker performance. But most importantly, it gives occupants a degree of control over their personal thermal environment by allowing them to adjust air flow rates and direction at any time."

Dr Drake believes the problem with most air-conditioning systems is that the layout of air-conditioning registers is

The layout of air-conditioning registers is usually designed before, and independently of, the layout of workstations, resulting in uneven air delivery to occupants.

usually designed before, and independently of, the layout of workstations, resulting in uneven air delivery to occupants. "This is mainly because air-conditioning is usually considered part of the infrastructure of the building, designed, installed and maintained by the building owner, while furniture tends to be the responsibility of the tenant.

"The integration of the air-conditioning and furniture systems, as evident in the Task Air approach, represents a radical variation from the usual demarcation of ownership and responsibility between these two parties, providing a flexible and adaptable system that can be changed to suit the needs of the occupants. "In other words, air-conditioning is predominantly a building feature rather than a fitout feature. In commercial

contexts, many of the problems of thermal comfort arise because of the degrees of separation between user, employee, facility manager and owner. By putting air into the furniture, it improves the potential for thermal comfort and energy efficiency by delivering air to where the users are actually sitting, and gives them control over its delivery in both space and time.

"The majority of energy use in cities relates to trying to cool entire buildings, yet a lot of users find central air-conditioning uncomfortable. I think personal ventilation has a lot of potential to solve both problems at the same time.

"I am also interested in the potential for spatial variation in thermal conditions, so that users are not exposed to the same thermal environment throughout the building, thereby allowing for temporal

variation as users take a break from their desk and go to a meeting or take a break for food, water, coffee, or toilet."

BRISBANE INSTALLATION

Chad Brown at Thomson Adsett Architects, which designed the New Port Office building in Brisbane, says that the specification of Task Air for the building is part of an overall approach to achieve the highest-quality internal environment.

"The delivery of high-quality air was a key consideration in protecting people's health, and there are also energy efficiency benefits," he says.

"By delivering air directly to individual workstations rather than blowing it from overhead diffusers, which requires higher temperatures, energy savings can be achieved.



left: Chad Brown from Thomson Architects.

below: Vents positioned in workstation panels allow individuals to regulate their own personal microclimates.



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"We have also specified Task Air for the EPA's new commercial building in Brisbane. In that case the personalised ventilation system will be brought up through floor ducts due to high ceilings that make overhead connections to the HVAC system impractical.

"In designing new buildings, it is important to give close consideration to both health and efficiency aspects, so we see a good future for the installation of workstation-based microclimate systems."

According to the facility manager at the New Port Office building, Roger Waalder, indoor and outdoor conditions are monitored to ensure the most appropriate cooling, heating and lighting settings are selected to maximise comfort and energy use. Energy use in

the building is monitored, controlled and analysed by a computerised building management system. "There are four floors that provide a total of 4000 square metres of office space accommodating some 300 workstations, and each workstation has two Task Air vents. We have found that if relocation of workstations is required, reconfiguring the Task Air take-offs can be undertaken easily," Waalder says.

"Feedback from employees indicates that they are very comfortable with the personalised ventilation system, so this is likely to result in productivity benefits."

The New Port Office building has become the first in Australia to receive a 5 Star Green Star - Office Design V3 certified rating from the Green Building Council of Australia. **FM**

Hartley Henderson is a Victorian freelance journalist specialising in Australia's commercial property sector.

More information

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below: The New Port Office building in Brisbane has been fitted with Task Air workstations to maximise employee comfort - no more 'thermostat tyrants'!

