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# Smart desks: a cure for sick offices?

Twenty five Swedish office workers are about to act as guinea pigs to test prototype office desks of the future. These desks will sense when they are occupied, automatically turning on lights and other items of electrical equipment. They will also allow the occupants to control precisely the heating and ventilation levels, not merely of their individual desk but of different parts of their bodies.

Scientists from Sweden's National Institute for Building Research (KBS), who have developed the desks in a £75,000 project, believe that they could alleviate the "sick building syndrome" (SBS) which afflicts up to half of all occupants of modern offices. Symptoms of SBS, which is linked to artificially ventilated buildings, include itching and watery eyes, dry throats, lethargy, headaches, and blocked noses.

The Swedish scientists' optimism that their desk can reduce the incidence of SBS is based on Dutch research which has shown that absenteeism caused by SBS can be cut by 34 per cent if office workers can control their own thermal environment. Other studies have shown that office workers' productivity is reduced markedly if temperatures vary even slightly above or below optimum levels.

These optimum values can

vary by up to 8°C between different people and the same person can prefer different conditions depending on how tired they are, what clothes they are wearing, and whether they are working or relaxing.

A further complication is people who suffer from allergies or who are hypersensitive to indoor air may require more fresh air, while others may complain of draughts.

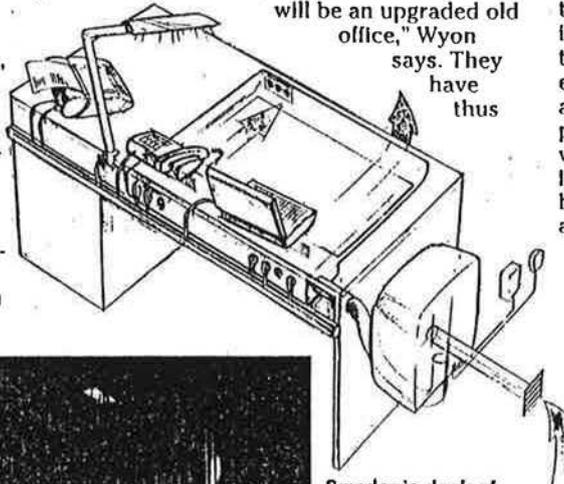
A particular problem with conventional heating and ventilationsystems is that, because warm air rises, tem-



peratures at face level tend to be about 2-3°C higher than at floor level. "It is difficult to keep a cool head without getting cold feet," points out Dr

David Wyon, research director of the KBS's Human Criteria Laboratory.

Originally the Swedish researchers had planned to develop an ideal office of the future, but they amended their plans to match cutbacks in new office construction. In most cases, "the office of the future will be an upgraded old office," Wyon says. They have thus



Sweden's desk of the future: will office workers warm to it?

developed a system which adapts almost any existing desk to smart operation and which works with existing air-conditioning systems.

The development is based on work Wyon did previously for Volvo, which has resulted in the company's trucks and buses being fitted with ventilation systems designed to provide ideal heating and ventilation levels to different parts of the drivers' bodies. The desk version consists essentially of two parts: a pedestal, containing a fan and electrostatic filter, which is linked to the existing ventilation system; and a control and heating panel a few centimetres thick which fits under the desk working surface. The two are linked by a ventilation hose which can also carry telecommunications and power cables.

A low voltage, resistive rubber heating panel, on the underside of the desk, heats the occupant's feet and lower legs, while fresh air is directed through vents towards their upper body at up to 7 litres/s. This arrangement has the effect of restoring an ideal heating profile and of cooling the torso. It also "improves the quality of air in the breathing zone," Wyon says. The controls allow desk occupants to raise the average temperature by up to 2°C or to lower it by 4°C.

The desk attachment has a load of 100-150W but, says Wyon, the net effect will be to reduce a building's electrical load, partly because the infra-red presence detector switches off the system and other electrical equipment when there is no-one at the desk. The savings could be substantial. Studies have shown that office desks are typically unoccupied for 65 per cent of the working day.

In later versions of the desk, further energy savings are expected because the desk controls will be linked to the building's energy management computer. "They will tell the computer where people are and whether they are feeling too hot or too cold," Wyon explains. The computer will adjust the main air-conditioning system accordingly.

The Swedes are about to put their theories to the test in field trials of the desk (which they are calling AeroClass), due to last several months. Wyon and his team will also test other versions including two for allergy sufferers, which draw in air from outdoors. Wyon is looking for manufacturers for the system which he reckons will add about £600-900 to the cost of a desk.

## Interlock ensures safe high voltage cable connections

To avoid the danger of electrocution, high voltage cable connectors are usually confined in locked and guarded enclosures. But this becomes impractical if the connections have to be made and broken regularly, as they do for equipment such as mobile welders, switchgear, and capacitor banks.

The klystron maker, EEV, faced this problem when designing a test cell. A guarded enclosure would have made it awkward to couple and uncouple 35kV cables in the cell.

Any alternative safety system had to address three potential hazards. It had to ensure:

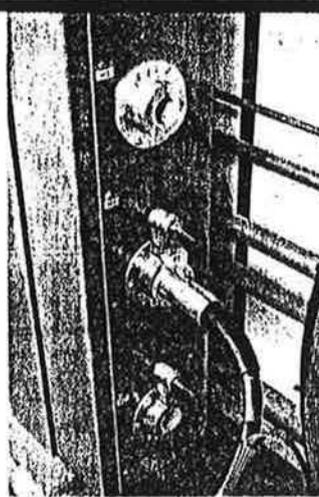
- that the cable connectors are pushed home fully, avoiding trapped air pockets which could cause the voltage to kick back to earth, possibly blowing equipment and injuring bystanders;
- that all connections are made before power is switched through and, conversely, that power is isolated before disconnection; and

■ that the cables are connected to the correct terminals.

EEV called in the industrial safety specialist, Castell, which came up with a simple, low-cost mechanical interlock which meets these requirements.

The first two hazards are dealt with by interlocking the HV cable connectors with the terminals. As the connector is pushed into place, a striker pillar attached to it engages with a lock mounted next to the terminal. A key in this lock is released only when the connector is tight enough to ensure a good contact.

This key can then be removed, securing the cable in place. The key is transferred to a control panel governing the main power switch. Keys from all the cable interlocks must be inserted and locked into the panel before the power can be turned on. Similarly, the keys cannot be freed until the power has been isolated.



EEV's connector: locks in safety

To tackle the remaining hazard, that of incorrect connections, Castell is using connectors which have modified flanges with unique sets of locating pins to ensure that the connectors are correctly oriented.

Castell is looking at other uses for the technique. It has already used a similar approach to make connections to aircraft power supplies.