LOW-PRESSURE UNDERFLOOR HVAC SYSTEM
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The following is a brief summary of the above paper. The complete paper is available to ASHRAE members from the archives.

The paper describes a system implemented in South Africa in the 1980s. The design of the system was prompted by the need for buildings to accommodate the computer revolution. It cites an article from 1985 in "Buildings," a facilities construction and management magazine.

> *"Current buildings place physical limitations on both the quantity and quality of automation. If it cannot be plugged in, the computer cannot be used. The standard lighting causes glare on the computer screen, so it cannot be read. If the room is hot and stuffy, worker concentration diminishes. If humidity levels are too low, static electricity can cause electronic equipment to break down. In other words, the building can have a decidedly detrimental influence on the implementation of automation."*

The paper then goes on to describe the need for personal control to eliminate what is now the number one complaint in office buildings. It stresses the need for load adaptability and flexibility to accommodate the higher rate of change in load distribution and layout for best performance of the office.

It goes on to point out that operating and maintenance costs are greater than initial cost and should be a major consideration. He suggests the use of value engineering of the system.

The system described consists of an air makeup unit and down-blow air handlers with the air distributed under an access floor system under low (zero) pressure. Fan powered floor air terminals move the air into workstations and areas of some load. The fan air terminals can be adjusted by the occupant for personal control. The paper goes on to stress the need for proper zone control and, by implication, the use of multiple and handlers. It explains the ability to use the building mass to reduce demand charges.

After the systems were installed, it was found that the only complaints regarding comfort were due to occupants' lack of training. This was easily overcome, and the complaints were eliminated.

As to the air quality, an environmental specialist checked for dust, CO, CO_2, O_3, SO_2, formaldehyde, and particulates, and no contamination issues were found under the access floor.

The remainder of the paper goes into some detail concerning power saving, reduced maintenance cost (due to easy relocation), and possible use of the system for remodeling.

The installations were in Johannesburg, South Africa, and showed a saving of 40% in energy consumption. The climate in Johannesburg is similar to Denver, Colorado, and is inherently comfortable with the dry, cool climate of a one mile high city. In the much warmer and more humid climate of most of the U.S., much larger savings can be obtained. The paper goes on to point out that the operating and maintenance costs are greater than the initial cost and should be a major consideration. He suggests the use of value engineering in the design.

Please note that the most significant part of this paper is that the results are based on actual experience in the field. The cleanliness, low power consumption , low particulate count, lower maintenance cost, and the virtual elimination of complaints, all were observed after the system had been in operation for considerable time.

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