

# Variable Speed Drives on Fan Coils Yield Savings

BY CHARLIE PUTZ

Facility professionals who thought the low-hanging fruit in energy conservation was gone now have something else to use.

While institutions are generally aggressive in pursuing central plant energy efficiency, fan coils are frequently overlooked as a potential source of savings. But the fact is, there may be several hundreds to thousands of fan coils in a single building or complex, and the fan coils employ a low efficiency motor (typically 60% efficient).

Part of the reason fan coils have been overlooked as a source of potential energy savings is that, short of replacing the unit with a more efficient one, there were not many cost-effective solutions available. The variable speed drive (VSD) technology that is now commonly applied to chillers, air handlers and pumps did not reach the fan coil, because VSDs were expensive, and fan coils usually employ fractional horsepower motors.

Now, however, the fan coil should be viewed as a source of substantial energy savings. VSD technology enables the fan coil to work in parallel with or independent with the building control system, making these VSDs an ideal retrofit solution to decrease the energy cost of a facility or multi-building campus.

## BACKGROUND

Fan coils units are essentially mini air-handling units which pair chilled water and hot water coils with a fan to circulate heated or chilled air. Model types include wall mounted, vertical cabinet style, stacked and overhead horizontal.

Fan coils are commonly used in all commercial applications. Users of fan coil units include:

- Education — grade schools, high schools, college and university campuses
- Health care — hospitals, nursing homes

- Lodging — hotels, condominiums, motels
- Office — low rise, multi-story, and office building complexes

## LATEST DEVELOPMENT

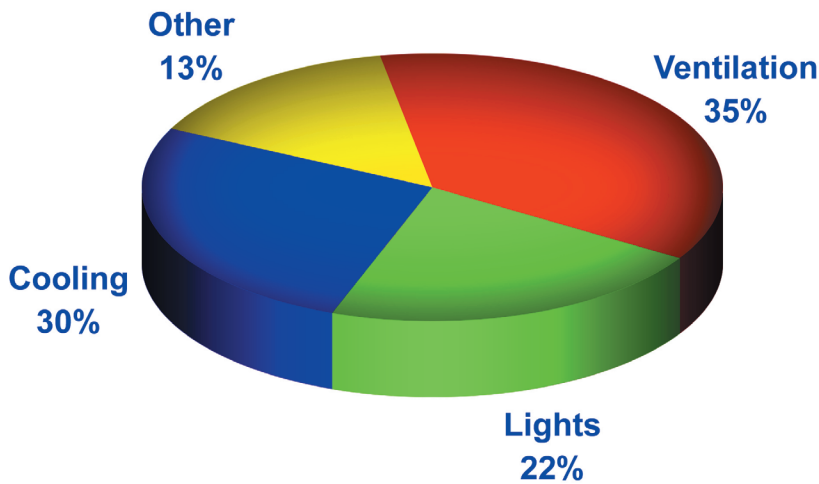
Carrier Commercial Service is offering the Comfort-Plus Drive unit for retrofit on fan coil units. This drive allows a facility to take advantage of the VSD's technology as an ultimate energy saving solution at an affordable price.

The variable speed drive has been reviewed and endorsed by the U.S. Department of Energy, and tested independently by the New York State Energy Research and Development Authority (NYSERDA), which has qualified installations for NYSERDA energy rebates. The unit is U.L.- and C.S.A.- approved technology.

The new drive employs intelligent and adaptive controls to give fan coil units the ability to match the blower speed/airflow to the actual real-time unit temperature output. Therefore, a blower motor that normally operates in an inefficient, binary mode (either off or full throttle), is modulated to deliver just enough output to meet the temperature set point requirement.

In addition to the energy savings from operating at variable speed, the fan coil unit delivers a variable quantity of cool or warm air, resulting in a more consistent comfort level, instead of the hot and cold pockets that can result from a constant speed fan coil throttling on and off.





This automatic variable flow of air in response to cooling and heating needs also eliminates the need for manual adjustment of fan speeds. The speed is automatically adjusted to maintain comfort in addition to saving energy.

Finally, the unit delivers this comfort and efficiency with a decreased noise level in the occupied space. Because the fan motor is not constantly modulating on and off, occupants in test spaces have commented on how much quieter the fan coils operate after being equipped with Fan Coil VSD.

**ECONOMICS**

The economics of the Fan Coil VSD retrofit are compelling. As an example,

cooling systems represent approximately 25% - 30% of the total electricity consumed. A fan coil system that has a total fan horsepower of 500 hp is actually consuming 833 hp based on the typical 60% fan coil motor efficiency. Older units may be running even less efficiently.

Tests have shown that fan coil energy consumption can be reduced by 45%, and also contribute to chiller water and hot water system efficiencies.

A fan coil system with 500 fan coils, paying 10 cents per Kwh, could save up to \$87,000 per year by retrofitting the fan coil VSD onto existing units, with a payback of 1.7 years and a return-on-investment of 58%.

**ENVIRONMENTAL IMPACT**

Using the fan coil VSD provides significant environmental benefit due to decreased greenhouse gases produced in some electricity generation. Using a value of 0.5 Kg/Kwh, for example, a hospital would reduce the CO2 generation annually by 438,999 Kg by using the fan coil VSDs.

The U.S. Environmental Protection Agency states that conversion to variable air volume utilizing a variable speed drive will typically reduce fan horsepower consumption by a 40% to 60%.

Further, a fan coil VSD allows for the cooling or heating of just the amount of air needed to meet the cooling or heating needs of the space. This reduces the load and requirement on primary equipment such as chillers, boilers, or steam systems.

**CONCLUSION**

Facility managers looking for a high-impact, low-cost solution to drive energy savings have a new tool to employ.

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