



Andrew Sargent is general manager of Advanced Air

The fan coil begins to fight back

Do chilled beams still have the edge when it comes to energy efficiency? A new generation of highly efficient units is tipping the balance back towards the fan coil, believes Andrew Sargent

Over the past decade there have been some significant changes to the terminal air conditioning market. During the late 1990s only a few chilled beam installations existed and to most designers this was a new and novel approach to terminal air conditioning systems.

However as the new Building Regulations progressively limited carbon emissions the focus on energy efficient systems intensified and it probably comes as no surprise to find out that the energy credentials of chilled beams were far superior to those of fan coils. Up until recently chilled beam manufacturers were able to demonstrate a 15-20 per cent saving in total building carbon emissions compared to the conventional ac constant speed fan coil units. With successive building regulations increasing the focus on carbon emissions chilled beams became very popular.

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However, fan coil manufacturers have now developed a new generation of highly efficient units which utilise the new technology in the form of ec motors. These motors have reduced average specific fan powers by factors in excess of 5 as per the graph in Figure 1. A further benefit of the ec motor is that you can vary the speed which gives variable air volume (VAV) and further significant savings in energy.

A further increase in the fan coil energy efficiency can be made by improving the fan deck design. Traditionally a vertically mounted centrifugal fan has been used, and to keep the fan coil height to a reasonable dimension so that it could easily fit into the ceiling void multiple small (low height) fans were used. The European ec fan deck has up to 5 motors each with their individual fan.

These fan decks are normally "bought in" by the fan coil manufacturer either from the motor supplier or another manufacturer. At Advanced Air we design and manufacture our own fan decks which means that we can adapt

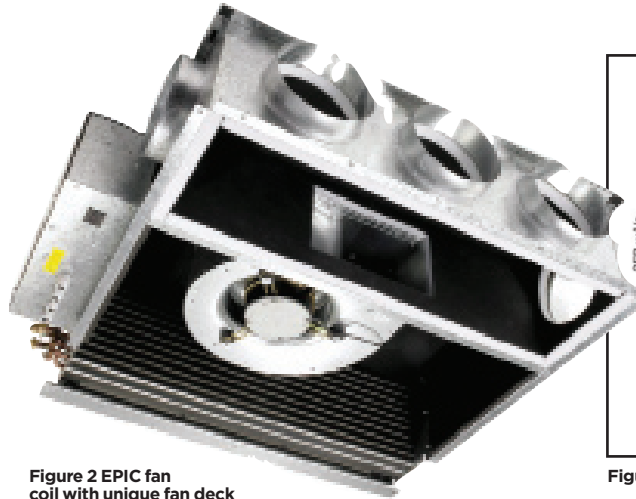


Figure 2 EPIC fan coil with unique fan deck

the fan configuration quite easily. We also have a strong working relationship with our American based ec motor manufacturer with full access to his R & D facilities. By combining the expertise of both companies we were able to develop a unique fan deck with only one horizontally mounted fan as per Figure 2. This innovation gave us a much lower SFP and a more efficient fan coil which neutralises the carbon emission argument between the two systems.

Since the launch of energy efficient fan coil systems with ec motors and the capability for variable air volume we have seen a significant shift away from chilled beams towards these new fan coil designs. According to the latest BSRIA/HEVAC survey figures the fan coil market value was more than double that of the active chilled beams value in 2010. Active chilled beams include both active commodity beams and active multi service chilled beams. The value includes the product unit cost and not any design or installation work.

It should be further explained that the market value for multi service chilled beams include other components such as the lighting which inflates the chilled beam market figures. However the passive beam is not included but it is a relatively low value and is probably similar to the component value so they could be considered to cancel

each other out.

Only a few years ago the market sizes for chilled beams and fan coils were very similar so this is a major and significant change. The question now arises as to whether this trend will continue. To examine this more closely we need to look at the market drivers as follows:

- Carbon Emissions: Even with high induction chilled beams there is very little difference between the two systems;
- Price: With carbon emissions similar the cost of the product and system will be a major driver. Here the fan coil can have a significant advantage in both product cost and installation. With demand in the construction sector weak competitive pressures will be such that the price/cost argument becomes an overriding feature.
- Cooling/Heating: Most all fan coils are supplied for heating and cooling whereas virtually all chilled beams are cooling only. The main reason is that with only the primary air inducing room air, stratification may be prevalent on the heating cycle. That is why most designers specifying chilled beams would add low level perimeter heating which is separate from the beam. The fan in the fan coil system can create a positive airflow over the heating coil thus avoiding stratification.
- Spatial Flexibility: With speculative office buildings forming a major part of the market, flexibility for the

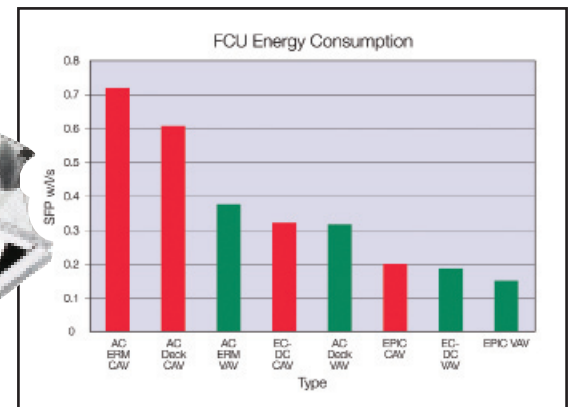


Figure 1 Graph of Specific Fan Power

developer means that letting the space is much easier with fan coils if partitions are moved and the system needs some modification. This can easily be carried out in the ceiling void and the worst case would be blanking/moving/activating diffusers as required. With chilled beams it is a major problem to change them and partitions normally have to be erected in predetermined positions.

- Comfort Criteria: Historically fan coils gained a bit of a reputation for being noisy but with a correctly designed system there is no reason that there should be any difference acoustically between the two systems. Also most projects require mock-up testing which should overcome any design issues. With fan coil systems high induction diffusers can be used which provide low velocities in the space. With chilled beams this is not an option and the air is discharged normally through a simple opening or a slot which has been aerodynamically designed.

From our own market research we are finding that consultants prefer to use fan coils not only for the reasons given above but because fan coils have been around for over 50 years and there is a huge reservoir of expertise available. Fan coils are also highly adaptable and it is possible to vary certain criteria to enhance or reduce performance in situ.