



ASW ENGINEERING MANAGEMENT CONSULTANTS

June 23, 2011

To: Steven Long, Pierre Landry, Rich Pulliam, and Cassie Cuaresma
SCE

From: Dennis Rowan, PE
ASW Engineering

Re: Investigations of Energy Efficiency Measures and Industry Standard Practice (ISP)
[Computer Room Air Handler (CRAH) Variable Air Volume (VAV) Project]

Dear Steven, Pierre and Richard, and Cassie

ASW recommends that SCE considers that the application of variable air volume (VAV) technology is industry standard practice for new installation or replacement of floor mounted computer room air Handler (CRAH).

PROJECT DISCUSSION

A data center facility, located in SCE territory, is the subject of this study. The data center and IT equipment occupies over 100,000 sq. ft. of space within the building. The balance of the building is dedicated for mechanical and other support spaces.

The data center contains a large number of servers of various generations and ages along with UPS systems and other ancillary devices. The space is arranged with rack mounted servers in an aisle configuration. The data center has a raised floor plenum for cabling and air distribution. This facility receives electrical power from the main campus meter and chilled water for cooling from the central plant.

Pursuant to an audit conducted at the data center facility many opportunities were identified to increase efficiency and to reduce energy consumption. Project analysis shows that the energy savings for this project will be delivered by replacing the existing CRAH units with entirely new high efficiency CRAH units utilizing variable air volume (VAV). The project proposes to replace in a large number of CRAH units.

The existing CRAH units have constant air volume (CAV) fan motors and are currently delivering excess airflow to the space for the heat load. Installation of new VAV-equipped CRAH units can now be done at a reasonable cost. This can be done without compromising the integrity of the data center and the technology will serve to reduce energy consumption by reducing unnecessary cooling air flow.

ASW ENGINEERING MANAGEMENT CONSULTANTS

METHODOLOGY

ASW contacted the Facility Manager at the project location, and asked about the equipment age and why they were replacing the units. He indicated that the units were nearing the expected end of their useful life and that it was nearing time for them to be replaced. When asked if the units would have operated for additional years, he replied that they would likely operate as long as they continued to maintain them. He was asked if there were increasing maintenance costs associated with keeping these older units on-line, and he responded that there were the expected increases associated with units of these ages.

ASW then contacted the chief operating officer of a company who manufactures computer room air handlers. This person indicated that their market was constrained to only those customers that were interested in VAV equipped units and that their company does not offer CAV units. Their perception of the marketplace is that most all of the units installed will have plenum fans with VAV controls. He further indicated that while there are several manufacturers that offer the base units without VAV, most installations will likely include the VAV option. He acknowledged that energy efficiency incentives are accelerating the decision for users to install the VAV-equipped units. He indicated that the incentives bring the payback(s) into a more actionable range. Some of the smaller users, having just one to three units, may have more difficulty making these economies work since the initial cost is a larger driving factor in these markets.

A sales representative of another major brand of computer room air handlers was contacted since their product line contains the option of CAV and VAV units. This person was asked about the VAV option and the option availability on their units and he indicated that it is his company's standpoint that the VAV option gives considerable energy savings over the CAV unit. When asked about the trend for these installations and the likelihood of the system being installed without the VAV option, he stated that fewer customers want a CAV unit any more. He was also asked about the influence of the rebate programs and he indicated that the customers are likely to install these VAV units with or without the energy efficiency rebates. While the rebates do lower the paybacks from 3.5 to 2 years, customers would still choose the VAV option at 3.5 years since the option offers them 12 to 16 plus years of additional energy savings after the initial investment is paid back. He also indicated that he has seen the customer concerns for energy efficiency rise from fourth place operational consideration to second place from 2004 to 2010.

The sales manager of an additional major brand manufacturer was also contacted and asked about the nature of the market with regard to CAV vs. VAV CRAH units and their frequency of installation today. He replied that the state of the market right now is that CAV is still being used for smaller sites, but a larger installation is going to install VAV. He was asked if a site with 5 or more units would consider installing CAV units right now in this market. He replied that anything over 5 units would not be viable as a CAV option. Any 5 or more unit site would not likely consider a CAV system and would only install a VAV system today.

A data center specialist was contacted from another major brand manufacturer. This contact was asked his opinion regarding the current state of the industry with regard to VAV CRAH units being installed as replacements or as new construction. He replied that, in his opinion, "All floor mounted CRAH units have fans operating as VAV regardless of their installation being replacements or new construction." Even though there are options to purchase the CRAH units without applying the VAV optimization, it is rarely done. He was then asked if a site installing 5 or more CRAH units would install CAV units today. His reply was that this size of a site would choose to install VAV as the most common choice because they are more energy conscious. Smaller sites might be less energy conscious and they might operate CAV units, but the larger sites are typically operating VAV units to lower operating costs.

ASW ENGINEERING MANAGEMENT CONSULTANTS

ASW presents the following matrix of factors for your consideration regarding the CRAH VAV project:

Table 1: Factors indicating Industry Standard Practice

Factors Indicating Industry Standard Practice	Significance (1 – 3) 1=low, 3=high	Significance Explanation
It is widely accepted that the VAV is the applicable technology to install for these types of units	3	All experts queried shared this conclusion without exception in regard to new or replacement CRAH installations.
Customers will install this technology with or without the incentives	3	There is agreement that this is the case for new or replacement CRAH installations, even at the site level
Energy Efficiency has moved to 2 nd place in terms of operational consideration from 4 th place from 2004 to 2010	2	The industry is aware that there is no reason for them to use energy and money inefficiently

Table 2: Factors indicating Non-Industry Standard Practice

Factors Indicating Non-Industry Standard Practice	Significance (1 – 3) 1=low, 3=high	Significance Explanation
There are still options that include CAV units	1	These units can and are still purchased
Smaller customers are driven to decision by these incentives	2	These customers deserve to be served as much as the larger customers



ASW ENGINEERING MANAGEMENT CONSULTANTS

The factors in Table 1 indicating that the installation of VAV-equipped Computer Room Air Handler (CRAH) is Industry Standard Practice (ISP) outweigh the factors in Table 2 indicating the project is not Industry Standard Practice. The primary consideration being that this technology is now the standard for new or replacement CRAH installations and incentives do not appear to be required for the measure to be implemented in these types of facilities. Additionally, the customers are more focused on energy efficiency and their understanding of energy use in these systems has developed over the past years.

While some of the smaller customer groups may be moved into action by the incentives, their program impacts must be weighed carefully if they are to contribute to the decision.

CONCLUSIONS

ASW recommends that SCE considers that the application of variable air volume (VAV) technology is industry standard practice for new installation or replacement of floor mounted computer room air Handler (CRAH).

Dennis Rowan, PE
ASW Engineering