

Executive Summary

This report studies the proposed DOAS and Chilled Beams System for optimizing energy efficiency at Clemson University AMRL. It also evaluates the lighting compliance and re-analyzes the lighting systems. Along with computing calculations, there are initial cost break downs and yearly simulation data. This reports intent is not to differentiate IDC's design, but to illustrate other systems and their energy savings.

A number of programs, references, and documents were used in this report to compute and compile information. One of the programs used is Carrier's Hourly Analysis Program (HAP). This program was used to compute the yearly energy consumption of the AMRL. The building's existing Chilled Water VAV system's yearly energy consumption is \$8,738,251. The proposed parallel system of DOAS with Active Chilled Beams had a yearly energy cost of \$5,968,853. With a \$2.7 million decrease in yearly costs, this constitutes a 31 % reduction in energy consumption. After running calculations, it is found that most of the building's sensible loads are met by incorporating 788 active chilled beams in the building, with DOAS taking care of all the latent loads and a small fraction of sensible loads. Not only does this decrease yearly cost and size of AHU's, but also drastically decreases environmental impact.

In accumulation to the depth analysis, breadth work was done in the lighting and construction options. In the lighting breadth, over half of the spaces had an excess in wattage according to ASHRAE Standard 90.1-2004. These areas of the building were re-designed to decrease wattage/sq. ft. while maintaining adequate lighting. This allows a decrease in yearly energy consumption and it also lowers environmental impact. In the construction management area, I analyzed the initial costs of the current Chilled Water VAV System and compared it to the proposed DOAS with Active Chilled Beams. It is approximated that a VAV system costs \$12/scfm, whereas a DOAS with Chilled Radiant Colling Panels (CRCP) costs a mere \$8/sq.ft. The new proposed system will be more cost effective, costing \$1.17/sq.ft less than the current system. Other items analyzed are the impacts of schedule due to different systems and an increase in pumps and plumbing equipment.