
Executive Summary

Clemson University ARML in Anderson, SC is an 111,270 square foot research facility owned by Clemson University.

The building's supplied air is given by 19 air handling units which feed into one plenum and serves the entire building. The units are made up of fifteen AHU units ranging from 1,000 to 11,300 cfm with VAV boxes that supply the lobby and office spaces. The remaining four units are MAH units ranging from 6,800 to 20,650 cfm. There are two 3,348 MBH gas fired boilers and one 4,094 MBH electric boiler. There are three 266.6 ton chillers and two 375 ton cooling towers.

The chief goal is to alter the existing HVAC system to conserve energy and decrease yearly utility costs. Secondary goals include decreasing the power density and optimizing the lighting in the building where densities are much greater than needed. In return, the other goal is to resize the electrical system components throughout the building which were affected.

In order to obtain the energy reduction desired, chilled beams will be one of the many options used in this study. The low fan speed used to deliver air to the outlet diffusers has a low energy requirement. They also operate at relatively high chilled water flow temperatures, meaning the chillers have to do less work than for a fan coil system.

Energy recovery is also a main design issue, and to ensure this, I will be using an energy recovery wheel with a purge section to re-heat my intake air to reduce cost on manual re-heat.

Since it is important to minimize the amount of energy required and maximizing the energy usage, an analysis will be conducted on the lighting in areas of concern.

Lighting can be one of the largest loads on a building. A well designed lighting system and conserve energy along with providing adequate lighting.

Integrating the chilled beams will have a noticeable reduction in energy consumption. Optimizing the lighting in the areas of concern will also show impact on the electrical load. Since both redesigns will show reduction of energy consumption, the electrical system will need to be re-evaluated with the new loads in mind. A small CM analysis will be preformed since ductwork, fan, and equipment will be downsized, along with the initial cost of the system.