

Mechanical Systems Project Proposal
December 15, 2006

Executive Summary

The Straumann USA renovation project featured the replacement of the airside systems of the facility while using the existing heating and cooling central plants of the building. Ten rooftop units serve a variety of spaces including manufacturing areas, offices, an auditorium, and dental operatory suites. The project was designed to comply with the requirements of the Massachusetts State Building Code 780 CMR.

The main goal of the proposed redesign is to take a different approach in designing the mechanical system for the Straumann USA facility while striving to reduce energy consumption. This redesign does not imply that there were flaws in the original design, or that another alternative should have been pursued, it is for educational purposes only.

The proposed mechanical system redesign is to replace the existing VAV system with a combination dedicated outdoor air system (DOAS) with a parallel radiant cooling system. The DOAS system will supply ventilation air and meet any latent loads, while the parallel radiant system will provide any additional sensible cooling needed. The mechanical redesign will also include comparing a direct-fire absorption chiller, with a centrifugal electric chiller to determine which would be the best selection for the central cooling plant.

The electrical breadth proposes to resize any electrical equipment that is effected by the mechanical redesign. The electric requirements of the DOAS air-handlers are less than those of the VAV units. A direct-fire absorption chiller would also reduce the electric requirements for the building resulting in some of the feeders, branch wiring, over current protection devices and panel boards needing resized.

The construction breadth proposes to perform a detailed first cost analysis between the VAV and DOAS systems as well as the two different types of chillers. Impacts on the schedule will also be considered for each system. There will be a significant difference in required materials for the VAV and DOAS systems. The DOAS system will require radiant panels, and more copper piping , while the VAV system uses a larger amount of ductwork and supply diffusers.

In order to carry out the proposed redesigns several methods will be used. Carrier's Hourly Analysis Program (HAP) will be used to calculate loads for the mechanical systems as well as yearly energy costs. For the electrical redesign, the National Electric Code will be used as a reference. Resources such as sales representative quotes, RS Means, and CostWorks will be utilized to calculate initial costs.

Overall, regardless of the final outcomes, the redesigns will be a very valuable educational experience.