SUNY ERIE COMMUNITY COLLEGE – STEM BUILDING

APPROACH

The mechanical and electrical systems design approach for this project was to design systems through the Integrated Performance Design Process. This process incorporates the collaboration of the Architects, Engineers, and the Owner at the earliest stages of a project to deliver the most energy efficient and cost-effective building possible. Modeling the performance of all building systems including the orientation, envelope, fenestration properties, heating and cooling plants, fume hood selection, lighting, domestic water heating and thermal comfort were all the components analyzed. This performance modeling matrix allowed the design team to optimize the building performance rather than various individual systems.

The unique nature of this laboratory building required specialized design considerations. The building program called for over 30 fume hoods that require increased levels of continuous ventilation air and exhaust air, which can be extremely costly. The fume hoods were designed to be variable volume which by design significantly increased the energy efficiency and sustainability of the lab exhaust system operation. Fume hoods maintain a constant face velocity regardless of sash position. To ensure accurate control of the average face velocity, VAV hoods were incorporated using a closed loop control system. The system continuously measures and adjusts the amount of air being exhausted and supplied to maintain the required average face velocity. The addition of the VAV fume hood control system significantly increases the hood's ability to protect against exposure to chemical vapors or other contaminants while maximizing energy efficiency.

The energy savings potential reduced the cost of treating the ventilation air and fan energy by nearly a third.

RESULTS

The result was truly an integrated design. Through this approach, the STEM building was projected to reduce its annual utility costs by nearly 32% while reducing the total building energy usage by nearly 42% over a code minimum building.

This building was designed by following the Integrated Design Process. The measures that were utilized for this project included:

- High performance Envelope, including fixed window shading
- Variable speed hot water and chilled water pumping
- Variable speed fans
- High efficiency lighting systems, including daylighting controls
- Demand controlled ventilation
- Energy recovery ventilation
- High efficiency boilers and chillers
- Radiant perimeter heating strategies
- Variable volume fume hood control

This building design earned a LEED Gold Certification. The project was awarded an incentive of $81,408 under the NYSERDA New Construction Program.