INTEGRATED ENVIRONMENTAL SOLUTIONS

CASE STUDY
INTEGRATED EARLY STAGE ANALYSIS

CBT Architects

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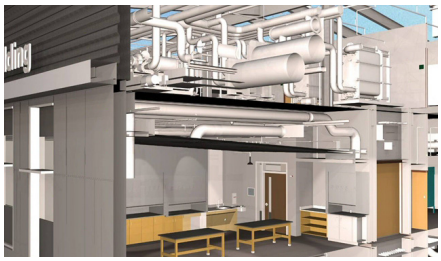
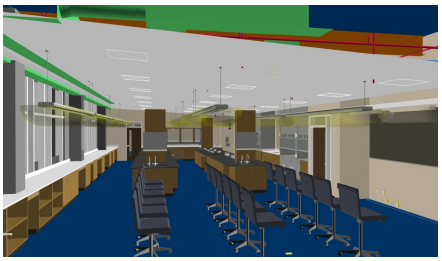
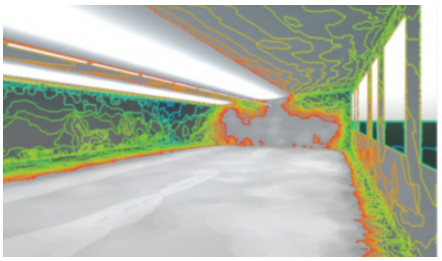




Architects use IES Performance Analysis software in unique collaborative and integrated design process, saving Fitchburg State University $1.5 million

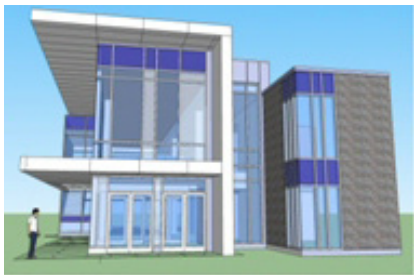
IES CASE STUDY: CBT Architects
SECTOR: INTEGRATED EARLY STAGE ANALYSIS
DATE: JANUARY 2012
COUNTRY: USA

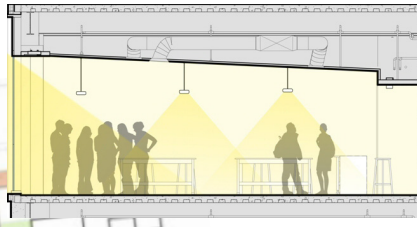
CBT Architects

Massachusetts-based Fitchburg State University is home to more than 5,200 students, hundreds of which utilize the 49,800 square-foot Science Building every day. In Massachusetts, all state buildings are required to be sustainable and have a minimum Silver level of LEED accreditation. University officials sought to renovate the existing building and build a 55,625 square foot addition in order to improve energy efficiency and meet its mandated LEED certification. The addition is due to be complete in spring 2013 with the renovation being complete by spring 2014.

The Project

Fitchburg State University Saves $1.5 Million with IES' Performance Analysis Software





Challenge

While adhering to a strict budget, University officials were faced with meeting the state's Silver LEED certification mandate and improving energy efficiency of the existing and new building. Because the building is located in the northeastern part of the country, it required high-performance heating, insulation and windows in order to keep occupants comfortable due to the primarily cool climates throughout the year. Other challenges involved determining how to cost-efficiently decrease cooling loads during warmer months, as well as improve ventilation and use daylighting to decrease reliance on artificial light.

Adding to these challenges was the essential collaboration among the multiple parties involved in the project. From the initial architectural mockups to implementing construction recommendations, it was imperative that the architects, engineers, energy modeler and commissioning agent work in unison to set performance targets and drive sustainability in the most integrated and cost-effective way possible.

> With IESVE, CBT was able to run through simulations and then work with their energy modelling consultants to evaluate what the projected renovation and construction costs and savings would be.
>
> **Alfred Wojciechowski**
> CBT Architects

Solution

The University enlisted the help of CBT Architects, a Boston-based firm that specializes in sustainable design, for the renovation and new addition. CBT used a selection of IES' VE-Pro performance analysis software modules to run daylighting, solar, thermal, ventilation and energy simulations throughout the schematic design process. CBT is leading the way in delivering sustainable design through an Integrated Design Process (IDP) which incorporates performance analysis. "If you want to do better than rule-of-thumb building, you can't rely on manufacturer data or the assumption that if something is more expensive, it's better to do," said Alfred Wojciechowski of CBT Architects. "You need to do specific simulations that are specific to your project and your situation, and specific to the way the building is actually going to be used."

According to Liam O'Sullivan of CBT Architects, CBT used IESVE "to look at a number of specific components within the building envelope, and built up different assemblies, some standard within IESVE and some custom." O'Sullivan added that, with IESVE, CBT was able to run through simulations and then work with their energy modeling consultants to evaluate what the projected renovation and construction costs and savings would be. With this unique integrated design collaboration, CBT was effectively able to advise and provide building performance insight throughout all phases of the construction process using IESVE's performance analysis, an industry first.

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> If we had been doing this project five years ago, without tools like IES, we would have gone in willingly trying to spend money to save energy, and could well have been putting money in that had no payback.

Alfred Wojciechowski
CBT Architects

Results

Designers hypothesized that thicker wall and roof insulation would lower energy costs, but IESVE software analyses showed only a negligible difference in efficiency performance. This prompted the use of less insulating material, resulting in capital cost savings of $60,000.

With IES software, CBT was also able to model a specific type of high-performance glass that was thought to reduce cooling loads. While analyses confirmed this, it also highlighted a corresponding increase in heating requirements, making the change impractical as the cost of the high-performance glass outweighed any gains in energy performance. University officials opted for a less-expensive alternative and ultimately saved $200,000 capital.

IESVE's daylighting analysis also triggered CBT to bypass plans for light shelf installation on the building's exterior, as data suggested the addition would actually hinder light penetration and increase reliance on artificial light. Forgoing the use of light shelves on the building's exterior cut around another $690,000 off the cost of the project.

Once IESVE validated that larger overhangs would improve efficiency, the addition resulted in a 21 percent decrease in cooling loads during warmer months. The University also selected natural ventilation in lieu of air conditioning to cool the building's stairwells, resulting in savings of almost $35,000 and a four-ton decrease in air conditioning cooling.

IES software, coupled with CBT's use of an integrated workflow, saved the University $1.5 million in construction and renovation costs and more than $34,000 annually in operating costs. Building efficiency targets were met in an effective manner with an architectural firm driving sustainability goals and providing recommendations from the onset of the project.

Cost Savings

$1.5 million in renovation costs and $34,000 annually in operating costs.

Summary

With IESVE, CBT was able to drive sustainability through performance analysis by acting as a central hub to the engineers, energy consultants and commissioning agents. This integrated workflow, essential for the future of sustainable design, resulted in the successful completion of an energy-efficient yet extremely cost-effective structure.

"Throughout the renovation and addition to the University's Science Building, IESVE guided CBT and was the 'primary tool for [their] simulations,'" according to Wojciechowski. In order to have the data and analyses needed to make informed decisions, Wojciechowski added, "You need to do continuous experimentation throughout the design phase and make sure that you have the data you need when you make those key decisions, not six or eight weeks after the fact."

The completion of the Fitchburg State University project is an excellent example of how taking a step away from the "business as usual" design process towards a more integrated one opens up significant opportunities for truly sustainable design.

For Further Information
Contact us at **enquires@iesve.com,** or call **0141 945 8500**.

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