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News You Can Use…

Building Modeling

With the price of energy, such as gas, oil and electricity, increasing, commercial and industrial consumers are looking to manage energy consumption. Today, there are many options to increase a facility's energy efficiency. There are also options available to manage and understand the high costs of energy, including improvements that can be made to make HVAC systems more efficient.

Local utility companies offer numerous incentives or rebates to owners for the installation of high efficiency equipment. The difficult part can be deciding what improvements to make to your facility. These improvements can be as simple as additional building insulation, replacement of windows, or decreasing unwanted air leakage. More involved improvements may include more efficient HVAC units and updating HVAC controls. There are also new direct digital control (DDC) technologies that can reduce energy consumption and cost. DDC can also give the owner or manager of the facility energy management control of the system, and provide energy usage feedback.

With all the energy management options available to owners, it can be tough to decide what options are best for your facility. Building modeling software is one tool that can aid in the decision making for energy efficiency options. The software can help determine costs versus payback of various project options. Given the building location and other physical properties, the software can be used to determine the heating and cooling demands for peak and off peak times of facility use. Minimum code requirements such as ASHRAE 90.1 and The International Mechanical Code, can be used to develop base case designs.

Alternatives can also be based upon actual utility rates for the local area giving the model even more accuracy. Once project costs are estimated, these costs can be analyzed and the owner can compare the amount of money required for the improvements versus the modeling results of energy use to determine the payback period for such improvements.

Whether energy modeling is used for a small renovation project or a brand new commercial mixed used building, the owner can anticipate energy costs for various alternatives based upon projected utility and operating costs. These software packages can make side by side comparisons and show increased building performance as more efficient methods of design are practiced.

Maine Medical Center
Pavilion Building—6th Floor Renovations
Portland, Maine
Architect: Morris Switzer Environments for Health

The scope of this project was to design HVAC, plumbing, fire protection, and electrical systems for renovation of approximately 13,500 sf of space within existing 1929 and 1956 vintage building areas. The areas provide patient sleeping, exam, treatment, and support functions for geriatric psychiatric patients.

The design challenge was to provide cost effective, state-of-the-art infrastructure systems within these older facility areas. Available floor-to-floor heights and existing building infrastructure were severely limited. The design also needed to address the special needs of the geriatric psychiatric patient population, including flexible environmental comfort and patient safety. Improvements in energy efficiency and indoor environmental conditions were imperative, as was the need to provide easily maintained spaces with challenging access to facility operations staff.

Our solution included new hospital grade, semi-custom rooftop air handling units for heating, cooling, and ventilation. Air is delivered to the spaces via medium pressure ductwork and variable air volume terminal boxes. Primary heating was provided by existing steam infrastructure, converted to hot water by with heat exchanger and pumps. Primary cooling was provided by a new rooftop chiller with integral pumping skid assembly. New exhaust systems were provided, along with new direct digital type controls interfaced to the facility's building automation systems for remote monitoring and management. Air devices in all patient spaces were non-looping security type; temperature sensing was accomplished with flat plate style tamper-proof security sensors.

The plumbing design included all new fixtures designed specifically for high abuse and physical protection of the patient population. The entire renovation area was provided with new security type fire sprinklers throughout.

Electrical design included a complete reconfiguration of the electrical power distribution to the renovation areas. Power distribution to patient areas is provided with ground fault protection, tamper-resistant devices. New high efficiency lighting was provided throughout with fixtures also designed for high abuse and patient protection. Fire alarm and other low voltage systems (i.e. telephone, data, nurse call, etc.) were also new throughout with devices designed specifically to protect the patient population.

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Simmons College
Mesick Residence Hall Upgrades
Boston, Massachusetts
Architect: DiMella Shaffer Associates, Inc.

In an era where change remains the omnipresent constant, regulating authorities thankfully do not generally require buildings, systems, and components to immediately follow the emerging building statutes, codes, regulations, and standards. For many good reasons, these things are generally required to meet emerging requirements only when they are built. Imagine trying to maintain buildings and associated systems and components to current codes throughout their life cycles.

But what of evolving building technologies that are proven to save lives? Shouldn't these be installed as soon as they are known to be effective? Answering questions like these, involved in the writing and interpretation of emerging codes and standards, is the work of stakeholders in the building construction industry, and the daily work of property owners, and building designers.

The Simmons College Mesick Hall Upgrades, covering about 30% of its 26,000 sf, is an example of balancing reasonable heartfelt issues of safety with logical and calculable issues of economy. At the Mesick Residence Hall common spaces had become run down. As the funds became available, project scope evolved into complete bath/shower room and lounge area renovations on each of the four floors, and laundry exhaust system replacement on the 3rd floor. On the first floor the common vending area, kitchen, and toilet room were also upgraded with new casework, furniture, plumbing, heating, ventilation, lighting, and power systems - as were the RD apartment's bathroom and kitchen. As the common thread, all the renovated shared areas of the building, were upgraded with a new fire alarm system meeting CMR 780 and applicable NFPA Standards.

The intent was to meet the relevant codes and standards, and at the same time to re-use and relocate existing smoke and heat detectors and horn/lights where appropriate. New horn/strobe units were added in the lounges, meeting room, and laundry room. New strobe (visual only) devices were added in the first floor renovated toilet/shower room, ADA compliant toilet room, and the RD apartment toilet room. The audible/visual devices were powered from a new booster power supply tied into the existing fire alarm system. The system included new fire/smoke dampers for new ductwork penetrations through the existing toilet/shower room exhaust shafts. The damper closing mechanisms are activated by passing heat or smoke. The closed dampers reduce the spread of smoke and fires between floors as occupants make their way to safety. The audible and visual signals of fire alarm alert the occupants, the emergency response personnel, and the owner's staff to safeguard life first, and minimize damage to property second.

Following construction, the installed fire alarm system requires on-going inspection, testing and maintenance per provisions of NFPA 72 Chapter 10 "Inspection, Testing and Maintenance". When it comes to life safety provisions we can never be current enough.

TD Bank
Queens Village, New York
Architect: Bergmeyer Associates, Inc.

Located in Queens, New York, TD Bank is a 3,800 sf retail banking center which is targeting LEED Platinum status. This location is slated to be the company's prototype building and will serve as an example for all new TD Bank branches being built across the United States going forward. Our challenge was to design HVAC, electrical and plumbing systems which conform to the highest efficiency and environmental standards set forth for LEED-certified buildings, and also allow for flexibility so the design can be adapted to various climates and local codes.

Primary heating and cooling are delivered by a variable refrigerant volume (VRV) system, consisting of an outdoor air-cooled condensing unit and wall or ceiling mounted fan coil units in the individual zones. This allows for each space to maintain optimal temperature without over or under-conditioning adjacent spaces. Ventilation air is provided by an energy recovery unit located on the roof, which uses energy from the conditioned air being exhausted from the building to pre-condition the outdoor air. This unit is driven by interior CO2 sensors, which ensure adequate ventilation air will always be provided when needed, but that energy will be conserved when it is not.

High-efficiency light fixtures with space occupancy sensors were used throughout the facility to minimize energy used for lighting. State-of-the-art LED lighting fixtures were installed into the building's entrance mullions to illuminate exterior signage with a modernistic temperature of light. Nearly all the lighting inside of the space, including the cove lighting, is controlled using a high-end lighting control panel. This panel allows the owner to set lighting themes for specific situations, and dimming capabilities as well. The electrical service is tied into a photovoltaic system, which uses photovoltaic panels on the building's roof to capture the sun's energy and converts it into usable electricity, thus significantly decreasing outside energy consumption. The lighting system also incorporates active shade controls and dimming to reduce lighting power cost. With the combination of daylight harvesting and energy efficient lighting and controls, TD Queens Village is well on its way to becoming LEED certified.

A new high-efficiency electric water heater was installed to provide domestic hot water for the building. The chiller for the new drinking fountain uses an eco-friendly refrigerant that has an ozone depletion potential (ODP) of zero. Low-flow fixtures, water conserving dual-flush toilets and waterless urinals complete this environmentally sound design.

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