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Muskegon Community College – Muskegon, Michigan

Siemens Implements Facility Improvement Measures to Help College Gain Control over Campus Automation while Generating Energy and Cost Savings

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Muskegon, Michigan – Located near Lake Michigan, Muskegon Community College (MCC) offers its students, both recent high school graduates and others looking to continue their educations, more than 80 degree and certificate programs. These programs help prepare students for the changing workplace, while meeting career demands for many industries including alternative energy and the medical arts.

To continue attracting students from the West Michigan area, MCC is committed to maintaining its capital budget while improving: facility engineers' ability to control campus automation; the campus' lighting, HVAC, and energy efficiency technologies; and the overall comfort of campus buildings. In 2010, MCC engaged Siemens Industry, Inc., in a performance-based energy conservation project to achieve those objectives.

Client Objectives

Protecting the college's budget—and taxpayer funds—is a key objective for MCC. Through the performance-based energy conservation project with Siemens, MCC needed to:

- Protect its capital budget
- Make facility improvement measures
- Take advantage of energy-saving lighting and HVAC technologies
- Reduce energy consumption, and
- Generate both energy and operational cost savings

In addition, MCC's physical plant engineers needed to gain more control over the college's automation system. MCC

engineers looked to upgrade the existing pneumatic system to a digital controls-based Energy Management System (EMS), which would allow for greater flexibility, control, and expansion with the college's needs.

Siemens Solutions

Following a competitive bidding process, MCC selected Siemens as its energy services company, due in large part to the experience Siemens had with institutions of higher education. As part of the performance-based energy conservation project, Siemens implemented a variety of facility improvement measures, including:

- HVAC replacements and retrofits, including:
 - Central plant pump motor – The central plant boilers' standard duty pump motors were replaced with premium efficiency motors and variable frequency drives (VFDs), allowing the heating system to respond more efficiently to changes in building load.
 - Standard duty motors – Siemens replaced eight standard duty motors with high-efficiency motors that are modulated based on building occupancy and outdoor air conditions. The addition of VFDs maximizes the efficiency of these new motors.
 - Cooling towers – Two cooling towers were replaced and retrofitted with VFDs, improving both the operating efficiency and runtime of the new equipment as well as the power consumption of the cooling towers, particularly during peak cooling hours.
 - TV studio – MCC hosts a television studio, in which Siemens deployed a DX-cooling unit ventilator to cool

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the space, rather than relying on the central cooling system. Continuous monitoring helps ensure the studio remains in a comfortable temperature range.

- Indirect domestic hot water (DHW) system – In the gymnasium, Siemens implemented an indirect DHW system that would respond more efficiently to hot water demand and usage.
- Pneumatic controls upgrades, including:
 - Time of day optimized scheduling - The control system was upgraded to allow the automatic scheduling of eight HVAC units.
 - Demand control ventilation – Siemens added CO₂ occupancy controls and monitoring to three of the college's nine air handling units; with this monitoring, the controls system can adjust the outdoor air damper positions and supply/return fan speeds to generate energy savings and reduced equipment runtime.
- Lighting retrofits – Siemens implemented standardized lamp wattages, ballasts, and colors throughout the campus to improve the efficiency of light fixtures while improving the appearance of campus spaces.
- Parking lot lighting control – In six sections of the MCC parking facilities, Siemens installed lighting controls to utilize time of day scheduling and daylight sensors. These controls determine whether or not to light the parking lots, which reduces lighting costs through both energy usage and lamp life.

Additionally, the parking lot lighting project has provided MCC with greater flexibility in lighting its outdoor spaces. For example, if the school hosts a tennis match or other outdoor event, those requirements can be accommodated more effectively through the updated lighting controls system.

We had a solid working relationship with Siemens. All contractors who worked in our facilities were very good about scheduling work so as not to disrupt classes and other school business.”

– Gerald Nyland
Director of Physical Plant

In working with Siemens, MCC was able to tap into the expertise of its existing electrical and mechanical contractors, who brought a deep knowledge and understanding of the college facilities and how they worked. The collaboration between

all contractors, Siemens, and MCC provided flexibility in how and when solutions were implemented.

Client Results

Because these solutions were implemented as part of a performance-based energy conservation project with Siemens, MCC was able to take a new and holistic approach to facility improvements. The performance contracting model allowed physical plant engineers to address multiple areas of concern, including areas where deferred maintenance had become problematic. And working with a single source for the total implementation—from financing to construction and implementation—meant that MCC could eliminate the

extra steps and timeline requirements often involved when managing and coordinating multiple third parties.

During the first year following implementation, the facility improvement measures combined to save MCC \$90,347 in energy and operational costs, outpacing the guaranteed savings of \$85,715. Energy usage was reduced by:

- 767,571 kWh (electric)
- 1,083 MCF (natural gas)

Siemens engineers calculated these cost and usage savings by comparing baseline, pre-installation energy usage measurements through the Measurement & Verification (M&V)

process. These reductions mean that the

school is burning fewer fossil fuels, reducing the effects of greenhouse gas emissions. The environmental savings offer the annual equivalents of:

- 4.4 acres of forest preserved from deforestation
- 3.3 railcars of coal
- 116.6 cars driven

These reductions have combined to help MCC receive a \$48,000 rebate from its local utility. With the energy and operational cost savings, MCC has been able to protect its capital budget and partially fund the facility improvements. The school can also use the additional funds to engage in other energy conservation and facility improvement projects.

“Siemens engineering team listened carefully to our ideas and incorporated them into the overall project. We were all able to contribute to the project’s success—our electrical, HVAC, all staff provided input, which was important because, in the end, we live with the results of the project.”

– Gerald Nyland

“The lighting improvements have greatly improved the appearance of our campus. Previously, you could walk into a lecture hall or classroom and see different lamp colors or brightness. Now we’re standardized, which not only helps our campus look better, it helps with inventory control.”

– Gerald Nyland

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