



#### CASE STUDY SUMMARY

Swinerton's 260 Townsend building was retrofitted with a building management system.

- Participant: Swinerton Inc.
- Building Type: Office building
- Site Sizes: 66,943 sq. ft.
- Project Cost: \$40,000
- Project Payback: 1.7 years for the BMS
- Energy Savings: 1,072,000 kWh and 2,700 Btu each year
- Primary Benefit: 50% energy cost savings for electricity and natural gas

## Swinerton's building management system improved air quality, increased occupant comfort, and saved energy—all with a 2 year payback.

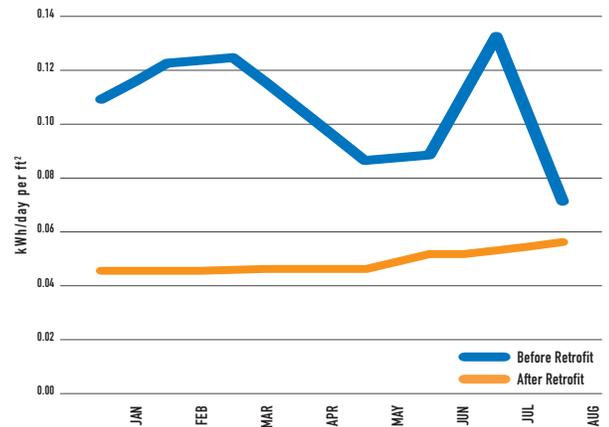
**S**winerton's mission is to be the "premier green building contractor in the West". As a part of greening their 20-year old headquarters building, they installed a new building management system. The system controls temperature, ventilation, and lighting systems through a web browser and provides instant energy usage data. By using this enhanced automation as well as more efficient lighting technology and making other improvements, Swinerton reduced energy bills by 50 percent.

- 20 year old building management system
- High operating costs

**PROBLEM**

In August 2002, Swinerton consolidated several branches into one corporate headquarters. They chose an existing building in San Francisco they had constructed for a client several decades earlier and retrofitted it using sustainable design and construction practices they encourage clients to consider. This approach included energy management. In order to reduce energy use and lower operating costs, the company needed an aggressive energy saving plan. The existing building management system had been installed during the initial construction, making it twenty years old by the time Swinerton began renovation.

**Electrical Demand at 260 Townsend**



The graph above shows a 50 percent reduction in electrical demand at 260 Townsend before (2002) and after (2003) retrofits.

- State-of-the-art building management system
- Direct digital controls
- High-efficiency lighting
- Sub-metering by floor

**SOLUTION**

Swinerton’s headquarters at 260 Townsend earned US Green Building Council Leadership in Energy and Environmental Design for Existing Buildings Gold certification, beating Title 24 by over 12 percent on this 20 year old building. Key to their success was the installation of an Emcor fully digital building management system (BMS). The system has a dedicated Internet website that continuously monitors temperature, CO<sub>2</sub> and humidity. This air quality monitoring feeds back to the BMS to regulate how much air is returned and how much fresh air is introduced into the building’s HVAC system. Swinerton’s BMS has a timed start-up and shutdown for the HVAC and lighting systems, reducing energy use. Each floor is sub-metered and the group using a floor is responsible for their share of the energy costs for HVAC and lighting. The lighting system was also retrofitted to new high-efficiency light fixtures with motion sensors. Altogether, these changes reduced the building’s energy usage by 1,072,000 kWh and 2,700 Btu each year.

*“It was the unanimous sentiment of the executives that despite a 2% to 3% higher initial cost of construction to build Green, the return on investment was virtually immediate thanks to higher productivity of employees, along with significant energy savings.”*

—Bill Krill,  
(Bill Krill and Kevin Brooks co-chair Swinerton’s Green Building Program.)



Kevin Brooks, Project Manager

*“The Building Management System puts you in control of your own destiny. It helps keep everything fine-tuned, extending the life of the system and diagnosing energy wasters early.”*

- Energy use reduced by half
- Real-time feedback
- Increased occupant comfort

## BENEFITS

Swinerton reduced their energy use from 0.10 kWh per square foot per day before the retrofits to 0.05 kWh per square foot per day. The new building management system also allows the facility management staff direct, centralized control of the building systems. The BMS homepage displays fans, boilers, chillers and cooling tower operation and allows control over schedules, lighting, power, alarms and air quality. Because the control system provides real-time feedback and has dedicated Internet access, facility staff can continuously monitor temperature, CO<sub>2</sub>, and humidity. Swinerton uses real-time data to look at usage trends and validate that systems and equipment are performing as they should. Staff use this data to immediately identify problems and keep the system fine-tuned, prolonging its useful life.

The BMS also ensures an adequate supply of fresh air. The system measures CO<sub>2</sub> levels and automatically adjusts the mixture of fresh and return air. Automated adjustments combined with green low-emitting materials and products incorporated into the renovation, ensure high indoor air quality. Better air quality, coupled with increased day-lighting has dramatically increased occupant comfort, raising employee productivity.

Though Swinerton is not currently participating in a demand response program, the new BMS can be configured to respond to energy prices, and respond automatically to demand events. Swinerton's system creates options for the future.

## PROJECT SITE DESCRIPTION

- Location:  
260 Townsend Street,  
San Francisco, CA
- Size:  
66,943 ft<sup>2</sup>
- Space Function:  
Office building
- Site Contact:  
Mary Anne Chille, Senior Project  
Assistant and Swinerton Green  
Building Program Administrator

## Equipment Installed

- Building Management System (BMS) Tridium System Installed by Emcor
- Building modeling with Energy Pro
- Direct Digital Controls (DDC)

## Energy Usage

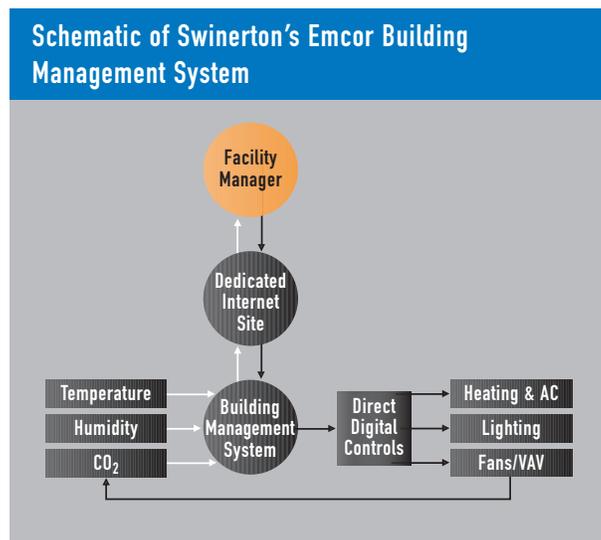
- Before renovations:  
0.10 kWh/ft<sup>2</sup> per day
- After renovations:  
0.05 kWh/ft<sup>2</sup> per day
- Summer peak demand:  
4,000 kWh/day
- Annual Energy Demand:  
1,230,000 kW
- Project cost: \$40,000



# Technical Information

**S**winerton hired Emcor to install their Tridum Building Management System (BMS). This system includes direct digital controls (DDC) that manage the building's mechanical and electrical systems, including the heating, ventilation, and air conditioning (HVAC) system. Variable frequency drives (VFD's) were also installed on their HVAC system's motors and fans to optimize the system's efficiency.

The BMS is web-based, allowing Swinerton's Property Services, headquartered in Colorado, to control the building systems remotely by logging into a secure website. The graphic user



interface gives staff control over the variable air volume control boxes, fans and lighting to centralize control over the buildings main systems and allow remote access. The system also monitors temperature, humidity and CO<sub>2</sub> levels. The BMS automatically adjusts the intake of outside air to ensure a proper mixture of oxygen and CO<sub>2</sub> to maximize air quality.

The BMS provides real-time feedback, lending itself to the quick development of trend reports on energy loads. Feedback helps immediately identify system problems and informs staff about building performance. An "audit trail" feature tracks database changes with user name and time. In addition, an alarm management component includes email and paging notifications to automatically and immediately notify facility staff of any mechanical problems.

The 260 Townsend building is sub-metered by floor and the group using each floor pays for the energy they use. Lighting, for example, is programmed to shut off at 6:00 p.m. Employees working later must call in with a password to override the system. Their group is then charged for the extra lighting load. With the central web-based controls and sub-metering, the BMS achieves a sophisticated combination of control and accountability.

## TAKING THE NEXT STEP

A list of certified demand response contractors is available at: [www.energy.ca.gov/demandresponse/documents/qualified\\_firms.html](http://www.energy.ca.gov/demandresponse/documents/qualified_firms.html)

Free resources are available from the California Energy Commission at: [www.energy.ca.gov/enhancedautomation/](http://www.energy.ca.gov/enhancedautomation/)

### ■ Business Case Guidebook

### ■ Technical Options Guidebook

### ■ Case Studies

- 1 Alameda County
- 2 Hewlett-Packard
- 3 Comerica Building
- 4 Foothill-De Anza Community Colleges
- 5 Staples, Inc.
- 6 Doubletree Hotel Sacramento
- 7 Albertsons
- 8 Arden Realty/next>edge
- 9 Contra Costa County
- 10 Hilton, Palm Springs
- 11 PETCO
- 12 Swinerton Inc.

### Research on Demand Response:

- <http://drrc.lbl.gov/drrc-1.html>

### Additional Resources:

- [www.fypower.org/now/demand\\_resp.html](http://www.fypower.org/now/demand_resp.html)
- [www.sdge.com/business/drp\\_index.shtml](http://www.sdge.com/business/drp_index.shtml)
- [www.pge.com/biz/demand\\_response/](http://www.pge.com/biz/demand_response/)
- [www.sce.com/RebatesandSavings/LargeBusiness/DemandResponse/](http://www.sce.com/RebatesandSavings/LargeBusiness/DemandResponse/)