

Elmhurst Memorial Hospital Monitoring-Based Commissioning

Facility Data: 866,000-square-foot hospital in west suburban Chicago, including 15 surgical rooms and two C-section rooms.

Scope of Project: G/BA commissioned mechanical, electrical, plumbing, and related building automation system controls, as well as a new central heating and cooling plant, in a major design/build project.



Project Summary:

Elmhurst Memorial Hospital (EMH) is an 866,000-square-foot, state-of-the-art acute care facility in Elmhurst, IL. The hospital features 259 private beds, a high-tech emergency services department, and technologically advanced surgical suites. The \$450 million hospital has 15 air-handling units delivering 540,000 CFM; a 5,500-ton chiller plant; and a 2,400-bhp steam boiler plant.

Opened in 2011, the Prairie-style facility includes all-private inpatient rooms with individual climate controls and natural lighting. According to the project management team, much thought was given to efficiency and safety. "The rooms are all oriented the same way, streamlining staff procedures and eliminating confusion. Related critical care components such as the emergency department, the intensive care unit (ICU), operating rooms and sterile processing are adjacent, maximizing employee efficiency and minimizing patient transport time. Other concepts likewise create efficiencies, such as linen closets in between rooms and decentralized elevators."

Grumman/Butkus Associates partnered with Schneider Electric (the software provider and controls contractor) to implement a comprehensive monitoring-based commissioning (MBCx) program at the hospital as part of the ComEd Smart Ideas energy efficiency program. MBCx is a method of achieving energy savings through the analysis of data collected from the building automation system (BAS).

In 2014, software was installed at Elmhurst Memorial Hospital to extract data from the BAS. The data was sent to the cloud, where it was organized and analyzed by the MBCx partner's software platform.

The analysis consisted of applying various algorithms to the data, seeking energy saving opportunities, maintenance issues, and indoor air quality issues. Simple algorithms, for example, looked for sensors that might be drifting from their setpoints. More complex algorithms looked for potential controls sequence improvements.

The results of the analysis were summarized electronically and were made accessible through a secure website. The data could then be filtered by various categories, including type of algorithm, equipment type, and potential energy savings.

The engineer and the MBCx partner periodically reviewed the results of the software analysis to look for energy saving opportunities. Maintenance and IAQ issues were also summarized. Anomalies were field-verified to rule out the possibility of false positives in the data analysis.

Energy calculations were also performed to quantify potential energy savings. A simple payback was calculated for each of the recommended

measures based on the potential savings and the contractor implementation costs. The hospital then selected energy conservation measures to be implemented.

The engineer supported the contractor during the implementation process. After implementation was complete, the MBCx partner's software was used to confirm that the ECMs were successfully installed and operational. Verification savings were computed for each of the measures.

This process was repeated multiple times throughout the MBCx project as anomalies were identified by the software. The cycle was repeated throughout an 18-month contract period, which allowed the software to examine the building operation through a full-year weather cycle to analyze both cooling and heating season opportunities.

Energy Efficiency

A total of seven ECMs were implemented during the project, with a **total verified annual savings of 794,000 kWh (\$36,000) and 74 kW in demand savings**. Measures included supply air temperature reset, condenser water temperature reset, economizer optimization, static pressure reset, and chilled water and hot water differential pressure reset.

Indoor Air Quality

As one of the energy conservation measures, the facility economizer sequence was improved, increasing the number of hours where the air-handling units were at 100% outside air.

Innovation

This MCBx effort is at the forefront of technology for the commissioning field.

Operations and Maintenance

A number of maintenance-related items were identified by the software. These included faulty temperature sensors and sensors requiring calibration.

Cost Effectiveness

The total cost for the project was approximately \$162,000, which included software and integration costs, monthly service fees (24 months), and engineering fees. The hospital received \$81,000 in ComEd incentives (\$25,000 software incentive and \$56,000 of incentives for implementation of ECMs). Along with an annual energy savings of \$43,000, the simple payback for the project was 1.3 years.

