CHAPTER/REGIONAL TECHNOLOGY AWARD - SHORT FORM

1. Category - Check one and indicate New, Existing, or Existing Building Commissioning (EBCx)

☐ Commercial Buildings	☐ New	☐ Existing or	☐ EBCx	
Institutional Buildings:				
☐ Educational Facilities	☐ New	☐ Existing or	☐ EBCx	
☐ Other Institutional	☐ New	☐ Existing or	☐ EBCx	
☒ Health Care Facilities	☐ New	☐ Existing or	☒ EBCx	
☐ Industrial Facilities or Processes	☐ New	☐ Existing or	☐ EBCx	
☐ Public Assembly	☐ New	☐ Existing or	☐ EBCx	
☐ Residential (Single and Multi-Family)				

2. Name of building or project: Elmhurst Memorial Hospital

City/State: Chicago, IL

3. Project Description: Elmhurst Memorial Hospital Monitoring-Based Commissioning

Project Study/Design Period: 07/2014 (Begin date (mm/yyyy)) to 05/2016 (End date (mm/yyyy))

Percent Occupancy at time of submission: 100%

4. Entrant (ASHRAE member with significant role in project):

a. Name: Butkus, Mattthew Steven and Shinnick, Tim (Last, First, Middle)

Membership Number: 7971230 (Butkus) and 8151595 (Shinnick)

Chapter: Illinois

Region: VI

b. Address (including country): Grumman/Butkus Associates, 820 Davis St., Suite 300

Evanston (City) IL (State) 60201 (Zip) USA (Country)

c. Telephone: (O) 8470328-3555 (main) d. Email: mbutkus@grummanbutkus.com

e. Member's Role in Project: Project Manager (Butkus) and Project Engineer (Shinnick)

f. Member's Signature: Matt Butkus

Digitally signed by Matt Butkus
DN: cn=Matt Butkus, o=Grumman/Butkus Associates, ou, email=mbutkus@grummanbutkus.com, c=US
Date: 2016.09.30 15:26:09 -05'00'

5. Engineer of Record: Matthew S. Butkus

By affixing my signature above, I certify that the information contained in this application is accurate to the best of my knowledge. In addition, I certify that I have discussed this entry with the owner and have received permission from the owner to submit this project to the ASHRAE Technology Awards Competition.

ELMHURST MEMORIAL HOSPITAL, ELMHURST, IL, MONITORING-BASED COMMISSIONING

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 110 million 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." [1]

Engineering consulting firm 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).

ComEd's MBCx program is an energy efficiency offering that provides incentives to customers for implementing monitoring-based commissioning services. Based on data collection and analysis, the MBCx team develops a list of no-cost and low-cost energy conservation measures (ECMs). The customer contracts directly with the service provider that is administering the monitoring-based commissioning and ECMs, and ComEd provides financial incentives for both the installed software and for implementation of verified ECMs.

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, to name a few.

The results of the software analysis were reviewed periodically by the engineer and the MBCx partner 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. For example, was a heating valve truly leaking, or had the discharge air sensor reading a rise in temperature across the coil failed, giving a false elevated reading? The engineer then developed scopes of work for each of the ECMs identified through the analysis, and procured contractor pricing.

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 & Maintenance

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

Cost Effectiveness

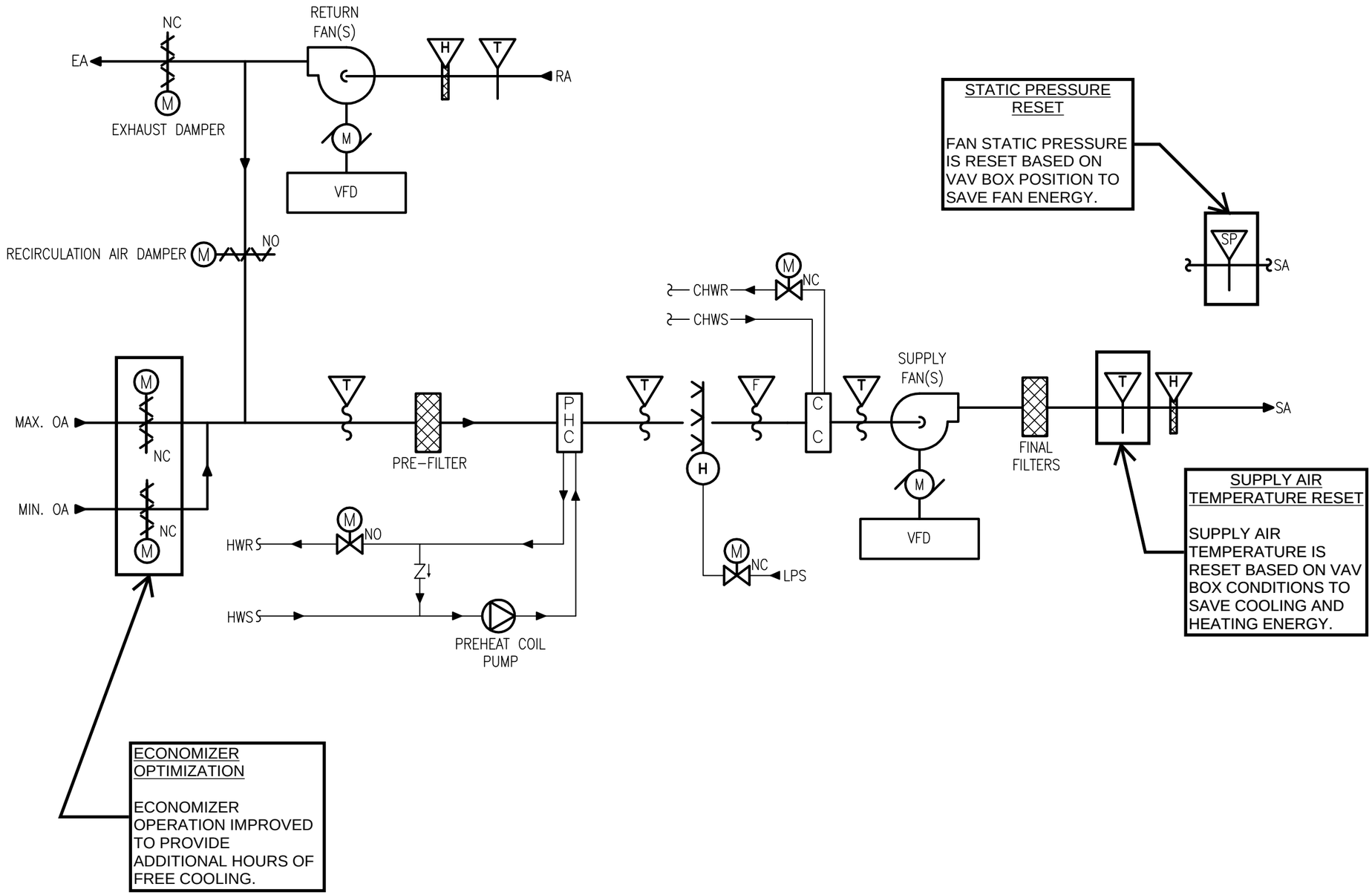
The total cost for the project was approximately $162,000, which included software and integration costs, monthly service fees (24 months), and engineering fees. The hospital received $81,000 in ComEd incentives ($25,000 software incentive and $56,000 of incentives for implementation of ECMs). Along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

Environmental Impact

This was not a focus of the project, though an energy conservation project such as this will have a positive environmental impact by reducing use of resources that contribute to a facility's carbon footprint.

Reference

1. "Hospital Opens Early, Under Budget." Hammes Company, www.hammesco.com/elmnurstgrandopening.htm. Retrieved 9/29/2016.



TYPICAL AHU CONTROLS DIAGRAM

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ISSUES & REVISIONS

NO.	DESCRIPTION	DATE

MBCx AHU ECM Summary
Elmhurst Memorial Hospital
155 E Brush Hill Rd
Elmhurst IL, 60126

DATE
DRAWN
APPROVED
SCALE
PROJECT NO.

SK
1

MATTHEW S. BUTKUS
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