

SHOWCASE PROJECT: C. F. MARTIN & COMPANY: RETROFITTED HVAC SYSTEM AT NAZARETH, PA FACILITY

SOLUTION OVERVIEW

C. F. Martin & Co., Inc. (Martin Guitar) was founded in 1833 by Christian Frederick Martin Sr., and has been continuously family owned and operated for six generations. As one of the oldest surviving acoustic instrument producers in the world, Martin guitars are manufactured by skilled craftsmen and women who superbly employ a mix of Old World craftsmanship and new technology.

In 2015, the Company's senior leadership decided to implement energy efficiency to improve its competitive edge. The C.F. Martin senior management team determined the maintenance and utility costs associated with the Heating, Ventilation, & Air Conditioning (HVAC) infrastructure at their Nazareth, Pennsylvania, guitar manufacturing facility had become unsustainable. The existing infrastructure was at the end of its useful life, with some parts of the system dating back over 20 years. Facility operators began to observe decreased reliability and increased maintenance costs from the existing system.

Many options were considered for retrofitting the aging HVAC system, ranging from relatively inexpensive replacements of the oldest of the 24 separate rooftop units to a complete overhaul of the HVAC system to installing a centralized plant. In the end, C.F. Martin elected to move ahead with the installation of a factory-built central HVAC plant that produces hot and chilled water (30 percent ethylene glycol inhibited for freeze protection). The final project cost came to \$8.85 million.

SECTOR TYPE

Industrial

LOCATION

Nazareth, Pennsylvania

PROJECT SIZE

200,000 Square Feet

FINANCIAL OVERVIEW

\$8,850,000

SOLUTIONS

The following improvements were implemented as part of the retrofit:

- 3 water-cooled chillers (each with a capacity of 500 tons), and associated cooling towers, pumps, and relevant accessories;
- A plate and frame heat exchanger for a waterside economizer, allowing for free cooling in colder winter months;
- 3 high-efficiency condensing boilers (each with a capacity of 5 MM BTU/hour input), and associated pumps and relevant accessories;
- Prefabricated pipe racks were installed throughout the roof of the facility to distribute hot and chilled water to the air handler locations;
- 18 custom air handling units.

The system was installed throughout 2016 and became fully operational November 1, 2016. The project required a large team, with an engineering consulting company supported by key plant staff. To validate the success of the implementation, C.F. Martin began tracking its electrical and gas savings in late 2016. During the first three months of operation, facility operators observed reductions in both electricity and natural gas consumption on monthly invoices in addition to online metering information available from Martin Guitar's utility companies. After completion, Martin Guitar saw a 20 percent reduction in natural gas consumption and a 46 percent reduction in electricity consumption. The expected savings for this project were 40 percent reduction in electricity consumption.

Due to the complex nature of the required pipe racks to support the new piping network, more than 100 new holes had to be cut in the facility's roof. Martin Guitar worked closely with the contractor to ensure that these holes were carefully made and that there was no impingement to the structural integrity of the roof.

OTHER BENEFITS

In addition to energy savings, facility operators identified many associated benefits from the project, including the following:

- Lower maintenance costs of \$150,000/year from not having to make repairs to the existing HVAC system;
- Increased reliability due to n+1 redundancy on the hot and cold water;
- Free cooling from the new waterside economizer in cold weather;
- More accurate humidity control, which is critical for guitar quality;
- A one-time Pennsylvania Act 129 Energy Rebate from Met-Ed of \$318,777.

Moreover, this project helped change how the employees at C.F. Martin & Co. think about energy. Energy is no longer seen as a fixed cost, but as an area that can be continuously improved. Additionally, the project led to increased awareness throughout the organization of the importance of energy efficiency. The emphasis on energy savings that came from this project has inspired C.F. Martin to look ahead at the next opportunity to become more efficient. Currently, the senior management and capital expenditure teams have approved a plant wide LED lighting upgrade in the facility.

Annual Energy Use

(Source - combined electricity and natural gas use)

Baseline(2015)
 193,421 MMBtu

Actual(2017)
 120,291 MMBtu

Energy Savings

38%

Annual Energy Cost

(Source - combined electricity and natural gas costs)

Baseline(2015)
 \$1,255,975

Actual(2017)
 \$751,971

Cost Savings

\$504,005

