A phased approach toward HVAC optimization restores VAV rooftop unit performance before winter sets in

CASE STUDY

KS Partners
300 GRANITE ST

KS Partners contracted FMC Technologies (FMC) to develop a turn-key solution for their 300 Granite Street property that would immediately deliver cost savings and improve occupant comfort. This tailored HVAC solutions would later be integrated into an advanced energy efficiency solution further optimizing building performance moving forward.

VAV ROOFTOP UNITS

Variable air volume (VAV) rooftop units are critical to delivering tenant satisfaction with efficient HVAC operation that reduces energy use and maintenance costs.

SOURCE OF VAV PERFORMANCE ISSUES

The building's VAV rooftop units' control system was missing several key control points, leaving it unable to provide precision control of the units' 12 stages of cooling, electric heat, and its economizer.

CHALLENGE

In 2018 KS Partners acquired the commercial office building at 300 Granite Street in Braintree, Massachusetts. They immediately identified issues with the control of its variable air volume (VAV) rooftop units that created high HVAC system operating costs, excessive failures, and a poor tenant experience. To address these problems, they brought in FMC to evaluate the building's HVAC and control system. FMC performed a detailed needs assessment to identify improvement opportunities and worked with KS Partners to develop a proposal that aligned with their business objectives.

SOLUTION

FMC designed an advanced energy efficiency solution that corrected the existing VAV rooftop unit issues and installed a building-wide Energy Management System (EMS) to enable more precise environmental control and cost-efficient operation. With the New England winter about to peak, the implementation would span two phases - the first overhauling the VAV rooftop units, followed by retrofitting the terminal boxes and installing the EMS (to be completed in 2019).

EXISTING VAV ROOFTOP UNIT AND HVAC ISSUES

1. The VAV unit control system was not fully installed and did not adhere to the manufacturer-specified load/unload sequences, leading to improper cycling that damaged several compressors.
2. The VAV unit economizer dampers were subject to harsh, binary on/off control, as opposed to the intended smooth control modulating based on outdoor and indoor air conditions.
3. The terminal boxes lacked direct digital control, reducing the scope of their control capabilities including localized control and a night set-back system, adversely impacting system operation.

PHASE I REMEDIATION STEPS

1. FMC installed the required control points and staged the compressors as prescribed by the rooftop unit manufacturer, preventing future damage and creating energy savings opportunities.
2. FMC implemented an enthalpy-based economizer with more efficient changeover settings incorporating humidity levels and installed resets that will connect to the EMS in Phase II.
3. As an interim solution, FMC added zone-based scheduling and night setbacks to improve performance until the EMS installation in Phase II.

RESULTS

FMC completed Phase I of 300 Granite Street in less than six weeks from the time of approval, and the building consistently maintained a comfortable interior temperature and immediately improved the indoor environment for the building's tenants. Additionally, FMC's work in Phase I laid the groundwork for a smooth and flexible transition to the Phase II building-wide EMS implementation.

About FMC

FMC Technologies provides advanced building systems that reduce building operating expenses, increase productivity, and provide a safe, comfortable working environment.

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