Abstract

A building's air system hardware and control strategy greatly impact the building's operational cost, carbon footprint, and air quality. This thesis presents a methodology for inspecting a building's air delivery system's hardware, analyzes different air system control strategies, and evaluates a day-night static pressure reset control strategy. The thesis focuses on air systems in 41 Cooper Square, although the methodologies presented can be applied to air systems in other buildings. Industry best practice and the observed inspection of the air system in 41 Cooper Square form the basis of a methodology for inspecting air handler hardware. Secondly, a review of the computer code that operates the air handlers contributes to a more thorough understanding of the air system's operation. The thesis covers observed issues in the air handlers' operation and operational changes implemented. Studying the historical data from the air handlers revealed that the supply air temperature setpoints on the air handlers may be too high. Furthermore, the thesis covers an experimental approach that used sensor data to implement and analyze a day-night static pressure reset strategy on one of the air handlers in 41 Cooper Square. The current implementation of day-night static pressure reset is estimated to result in \$6,500 worth of annual energy savings for the air handler studied without the need to invest in new hardware and without compromising the safety of the building's occupants. Comparing 2020 historical data from another air handler with day-night static pressure reset and other energy conservation measures to its operation in 2017 under constant static pressure revealed annual energy savings of \$18,200. The comprehensive study of different air handler code and control strategies in this thesis serves as a foundation for studies involving the interconnected and interdependent operations of building systems.