

161 North Clark Street Fan System Replacement

FIRST PLACE

ASHRAE Excellence in Engineering Award
Chapter Level

Project Highlights and Results

- Designed replacement to the supply and return fan systems associated with the primary air-handling units in a building experiencing high energy usage, costly pneumatic repairs associated with the existing fan systems, and poor overall system performance of the supply and return air fans that provided primary air to the building.
- Solution prioritized energy efficiency and fan redundancy, fit within existing AHU wall casings, maintained airflow to the building during construction, and achieved an aggressive project timeline for completion.
- Total annual fan energy savings in the first year of operation were measured to be 732,946 kWh
- Secured approximately \$90,000 in utility incentive funding.

Project Background

Owner:	CBRE
Location:	Chicago, IL
Team/Team Lead:	Jim Gibson, Bhupendra Tailor
Elara Role:	MEFPF
Construction Cost:	\$2,000,000

Project Overview

Building Type:	High-Rise Commercial Office
Building Attributes:	50-Stories, including leasable office areas, tenant amenity spaces, fitness center, underground building pedway connections to adjacent buildings; 1,100,000 SF
Initial Construction:	1992
MEFPFIT Systems:	Water -Cooled Chiller Plant, (2) Primary Supply/Return Fan Systems serving Medium Pressure Ductwork to Fan-Powered Boxes with Electric Re-Heats throughout the building

Innovation

- Utilization of variable-speed ECM fans in a creative array configuration allowed the fan systems to modulate fan speed based on duct static as measured at the top and bottom of the building's primary supply air shafts which serve VAV FPBs on each floor of the building.
- Improved indoor air quality was accomplished by optimization of the economizer sequences and replacement of the mixed air, outdoor air, and exhaust air dampers as part of the project.
- A unique design approach to the project was required because the existing chilled water coils located within each unit consisted of three separate coil banks installed in a "U" configuration upstream of the fans, with each bank 90 degrees with respect to each other. Elara's solution included:
 - A fan array equipment RFP to compare each system's first cost, efficiency, installation cost/complexity, and ability to meet project schedule even with long lead times during the COVID pandemic.



Innovation Cont.

- Extremely detailed measurement and verification were required to ensure the dimensional accuracy of the new systems and their ability to be installed within the existing unit casing prior to retaining a mechanical contractor. A structural steel frame system was designed to support the new bulkheads and fans.
- An array system design that mimicked the cooling coil layout to optimize the performance of all (3) coil banks in each air handling system. The unique fan array layout ensured that a majority of the double-wall panel air-handler casing could be reused, saving substantial cost and construction time on the project. Additionally, the fan-array manufacturer selected utilized pre-manufacturedpre-manufactured provided bulkhead walls and integral wiring harnesses for faster construction on-site to minimize downtime of the fan systems and reduce overall project duration and cost.