



Critical Ventilation for Transportation Life Safety

Overview

Developers in New York City are looking for innovative ways to utilize land. One method which has been used is to cover over open rail parcels of land and build over the rails. This has inherent structural and ventilation challenges due to the need to control fires, gas, and, in today's age, the potential for terrorism. The control of these life safety ventilation systems is vital.



Owner Requirements

The Manhattan West overbuild was unique from a construction, as well as control standpoint. The exhaust fans were installed inside of the deck above the tracks so trade coordination and upfront engineering was crucial in the process. The control system needed to not only control the eight (8) tunnel ventilation fans, but also control and monitor other systems. The scope included the following:

- Control eight bi-directional tunnel ventilation fans and dampers with airflow, temperature, and motor vibration monitoring in various ventilation modes.
- Instrumentation and control of the mechanical building for support of the fans including control of the air handlers, unit heaters, dampers, and air conditioning systems.
- Integration of generator, fuel oil tanks, UPS, batteries, hydrogen monitoring, and electrical system into a complete SCADA.
- Design and install a fault tolerant PLC system with redundant I/O and processor capabilities.
- Design and install a redundant fiber optic network to integrate the SCADA HMI screens to Amtrak Penn Station Control using Amtrak HMI standards.

Solution

EES was brought on board due to our experience with other Amtrak overbuild projects. The testing required by the engineer and Amtrak for system acceptance on this type of system dictated attention to every detail of the construction process. EES was brought on board a full year before the first span was installed to make sure the integration and start up would go smoothly. The stakeholders included, Amtrak, Brookfield Development, Turner Construction, New York City Fire Department, and the several million commuters who use the tracks below. This was a high profile project that needed to be done reliably and work consistently.



Characteristics of the new control system:

- Monitors all tunnel ventilation fan motor data through MODBUS communications with motor protection relays and motor starters.
- After a mode is entered by the operator, the system will automatically stage fans so as not to overload the electrical system.
- The system will take evasive action in the event of fan failure to start up back up fans so that the ventilation mode is maintained.
- Installed a redundant hot backup PLC system with redundant I/O network and power supplies for a reliable system based on life safety requirements.
- Installed a redundant Ethernet communication network with industrial Ethernet switches to maintain system communications.
- Installed an integrated HMI that displays all system operating parameters and alarm conditions utilizing the fault tolerant Ethernet communication architecture.
- Installed a fireman's local control panel for use by the New York Fire Department.
- Installed a remote alarming system to alert building personnel.
- Performed all necessary start up and commissioning on all controlled components including a full Amtrak 30-Day Operational test.

Results

The system was started up, commissioned, tested and is running in a reliable manner for Amtrak and Brookfield. The start up and testing process was executed efficiently with fully documented results for all stakeholders. Coordination with multiple system vendors went smoothly. EES also assisted in managing the process with the FDNY and Amtrak which lessened the owner's risk. As a result, EES is now involved with Brookfield in other overbuild and critical ventilation projects in the New York City real estate market.