



## TekWorx Optimization Control Makes the Most of Condensing Boiler Plant Design of NYC High-Rise

The statuesque condominium located at 205 East 59<sup>th</sup> Street isn't just another pretty NYC building; it has brains too. Located in the heart of midtown Manhattan, this 25-story luxury residential property has arguably one of the most efficient boiler and control systems money can buy. At the very least, it stands stories above what is typical of most NYC apartment buildings.

### PROJECT SNAPSHOT

**Facility:** 205 East 59th Street Residential Highrise, NYC

**Situation:** High-end residential property requires control that maximizes the efficiency of a condensing boiler design.

**Solution:** A TekWorx CEO Control & Energy Optimization System provides precision sequencing control of boilers, pumps, and valves associated with both the domestic hot water and heating systems.

**Comments:** "This is a proven, cost-effective application of high quality, high efficiency equipment."

*David Shepard  
President of G.A. Fleet Associates*

**A** TekWorx Control & Energy Optimization (CEO) System does the thinking for the unique heating and domestic hot water system designed for the building that was completed in 2005. Four 2 million BTU/hr gas-fired condensing boilers were selected to provide building heat, as well as 100% of the indirect heat required for the building's domestic hot water. The CEO system sequences the boilers for maximum efficiency. It also sequences and/or controls operation of (3) hot water pumps, automatic valves that control the flow of water to and from the heat exchanger, as well as the control valve that changes operation from summer to winter mode.

#### Capitalizing on a Condensing Boiler Design

Many New York high rise buildings rely on a central boiler plant to provide indirect heat for their domestic hot water system. However, most rely on large, cast iron or steel fire tube boilers that have limited turn-down and are costly to operate during the summer and periods of low

demand. The design selected for the 59<sup>th</sup> Street building takes a more efficient approach. Each of the condensing boilers modulates in tiny increments all the way down to 5% of load (20 to 1 turndown ratio) so the boilers produce only as much heat as is required and no more.

Condensing boilers are most efficient at partial load so sequencing control is critical. The TekWorx CEO determines the precise point when it is best to bring on an additional boiler and modulates two or more boilers down to low fire, making sure they are always operating within their most efficient zone. This not only reduces overall fuel consumption, it eliminates both cycling and standby losses.

The CEO also incorporates a domestic hot water priority feature that places priority on domestic hot water in the event that there is not sufficient heat for both the building and the domestic hot water.

Domestic hot water is generated through a brazed plate heat ex-

changer at a very high Delta T of 60 degrees, providing 100% of the heat required to heat the domestic hot water for the entire building. The return heating water from the heat exchanger merges with the other return hot water, effectively increasing the Delta T to a range of 30 to 50 degrees, depending on system conditions. The higher Delta T design is ideal since condensing boilers work best with low return water temperatures.

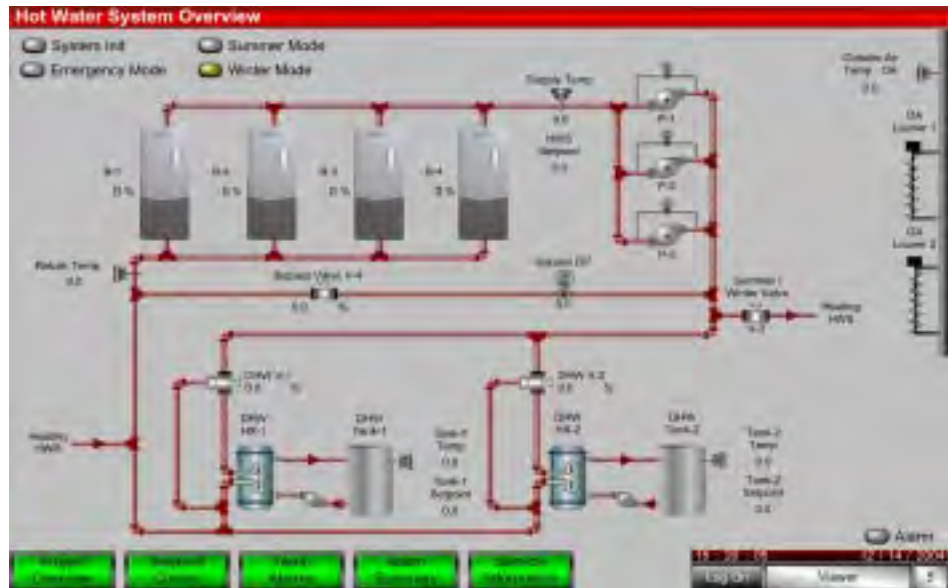
Eric Ettinger, President and owner of Ettinger Engineering Associates (New York, NY), whose firm provided the mechanical design for the building, favors this type of design because it provides significant fuel and electric savings over a conventional central boiler system.

Outdoor temperature reset is configured into the overall boiler control system. This feature automatically adjusts system set points based on outdoor temperature, which more accurately reflects the heat loss characteristics of the building, improving comfort and conserving fuel.

In addition, the CEO is programmed to detect various kinds of equipment failures, such as a pump or valve failure. If this should occur, an alarm will sound, and the control will automatically adjust set points so the basic needs of the building are met while the problem is resolved.

### Worry-free Control

According to Resident Manager, David Pierratos, the system has functioned perfectly since its installation in 2005, completing its very first heating season without issue. Pierratos notes that even after a



Easy-to-read TekWorx CEO touchscreens give authorized personnel access to boiler system operational data and set point control.

temporary shut-down to clean the pump strainers, the system had hot water to all locations in the building within 7 minutes of going back on-line.

“The system basically runs itself. We’ve had absolutely no problems,” said Pierratos, who checks the user-friendly TekWorx screen every other day or so just to make sure the pumps and boilers are running and set points are being maintained.

Like all TekWorx control systems, the CEO is carefully engineered according to a complex set of algorithms that takes into account the prime operating points of the entire boiler plant—not just the boilers themselves—so that overall plant performance is optimized. TekWorx communicates with the boilers via a ModBus protocol.

### First-Cost Savings, Too

When a property owner invests in high-end equipment, it is expected that operational savings will result; rarely does anyone expect first cost

savings on high efficiency equipment.

“This is a proven, cost-effective application of high quality, high efficiency equipment,” said David Shepard, President of G.A. Fleet Associates, the TekWorx agent in NYC. “The combination of high efficiency condensing boilers for both building heat and domestic hot water decreases the size and the installation costs of pumps, piping, and auxiliary equipment. We have contractors that are now redesigning conventional systems into high efficiency systems, while saving construction cost for their clients.”

According to Mike Flaherty, President of TekWorx, condensing boilers also provide greater opportunity to optimize overall plant operation. “This is an ideal application for the CEO,” said Flaherty, “one that can deliver serious savings for larger, multi-unit facilities.”