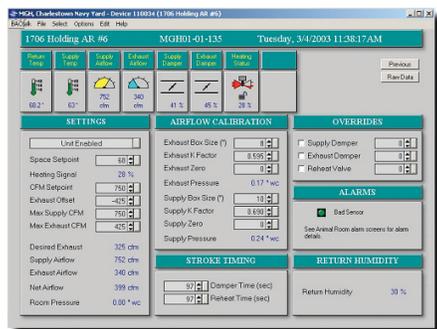


## MASSACHUSETTS GENERAL HOSPITAL | CASE STUDY

# Once a wreck, Building 114 on the banks of Boston Harbor now houses Massachusetts General's state-of-the-art research facility

Massachusetts General Hospital in Boston is the third oldest general hospital in the United States, and the oldest and largest in New England. Considered one of the best hospitals in the country, Massachusetts General receives hundreds of millions of dollars every year to fund its research efforts and is a teaching affiliate of Harvard Medical School, part of Harvard University. When Massachusetts General began plans to convert a decrepit industrial mill into a world-class research facility, Alerton solutions exceeded all expectations of this complex and challenging project.

In August 1999, Massachusetts General invited Energy Management of New England (EMNE), Alerton's Boston dealer, to bid on an ambitious project they were about to develop. Massachusetts General was familiar with Alerton systems from a site visit the hospital's representatives made to Northeastern University,



Interface screen for the Animal Research room displays detailed views so facilities staff can quickly and easily adjust setpoints.

also in Boston. At the time, Alerton solutions controlled exact temperature, humidity, and pressurization setpoints inside the university's high tech research facility. To headquarter its expanding research programs, Massachusetts

General needed available space quickly, outfitted to precise specifications.

The hospital looked to the banks of Boston Harbor for that space. Building 114, an ugly duckling in the Charlestown Navy Yard, was constructed in 1903 to build rescue and minesweeping boats. After the Navy Yard closed in the 1970s, Building 114 sat deserted for years, damaged by fire, vandalism, and partial demolition. Massachusetts General's ambitious plans gave Building 114 a second chance when it was selected in the late 1990s to house the hospital's state-of-the-art facility. Once gutted, the new 100,000 square-foot research center would accommodate 250 scientists who occupied research labs and a self-contained clean room as well as offices, study/library rooms, a conference center, and a lecture hall.

The numerous areas within the same building would each require a different temperature.

The most critical part of outfitting Building 114 was its animal area. The hospital's lab work used mice that were specially bred and therefore expensive. Because the animals had to live for the length of the research—eight to 10 years—their area had to maintain precise temperature and humidity setpoints. The labs housed refrigerators and freezers, maintained between -20°F and -80°F, as well as blood, chemicals, and medical gasses including CO<sub>2</sub>.

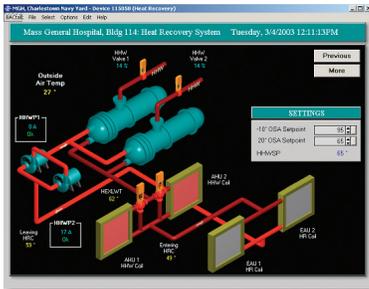
The waterfront location also posed a challenge. In the summer, moist, heavy air swoops in from the ocean. In the winter, the humidity-filled wind exacerbates temperatures in the low teens.



## MASSACHUSETTS GENERAL ■ CASE STUDY

*It's a challenge to change so much air that quickly, and still maintain the comfort within the building; With that much horsepower working at fierce speeds, you're basically in a wind tunnel, but it can't feel like one.*

*Andrew Cachel, President, Energy Management of New England*



*Heat recovery units for the main air handling units in Building 114; BACtalk's intuitive graphical interface screens vividly and realistically show equipment for simple, real-time adjustments.*

Andrew Cachel, president of Energy Management of New England, Alerton's dealer in Boston. "With that much horsepower working at fierce speeds, you're basically in a wind tunnel, but it can't feel like one."

Massachusetts General is a founding member of the Partners HealthCare System, which is composed of about 10 healthcare properties in Massachusetts. Partners HealthCare wanted a monitoring controls system that used open protocols so that their healthcare facilities could "talk" with each other—despite what vendor's equipment may already be in place—while seamlessly accommodating future growth.

The project included variable air volume (VAV) controllers and VisualLogic® controllers (VLCs), air handlers, humidifiers, boilers, fans, pumps, cooling towers, humidity sensors, chillers, and transfer switches. Operator workstations—distributed over Massachusetts General's wide area network (WAN)—use BACnet/IP of Alerton BACtalk® software to manage all the building's functions. EMNE installed a VLC, a humidity sensor, a space temperature sensor, and differential pressure sensors in each animal room to monitor the supply and return air condition and room pressure. Because of the 100% outside air and VAV system design, the building's air handlers had to ensure the incoming air maintained a constant temperature, and thus output it at the 55° discharge air temperature setpoint, which was ideal for the research labs and VAV terminals. Monitored by the VLCs, two air handlers treating about 160,000 cubic feet per minute (cfm) accomplished the task.

To maintain precise temperature, humidity, and air pressure setpoints, EMNE wrote a PID control loop to maintain a two-degree

Because Building 114 was designed primarily with a 100% outside air system—meaning no inside air is recirculated within the facility—the environmental controls system had to maintain a precise temperature, regardless of the outside climate.

"It's a challenge to change so much air that quickly, and still maintain the comfort within the building," said

differential above or below the set-point for temperature and an 8% differential above or below the setpoint for humidity. BACtalk allows operators to establish numerous critical alarm conditions to monitor these elements. Each of the 90 critical alarms for Building 114 is broadcast to the main campus' alarm center—about 10 miles across town at Harvard University Medical Center located in downtown Boston. Since different alarm conditions affect different doctors, maintenance, and facility staff, BACtalk simplified sophisticated procedures for alarm notification.

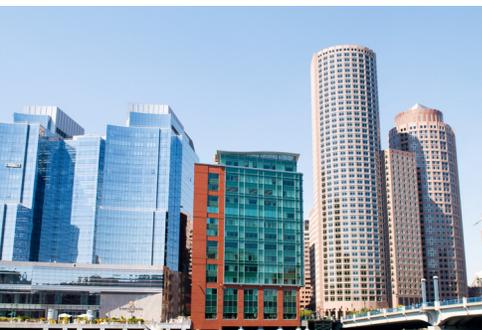
Because BACtalk is based on BACnet, the industry standard for building system interoperability, Massachusetts General enjoys simplified operation and maintenance of Building 114—regardless of any cross-vendor equipment—as well as unified training for their facility staff. As an open protocol, BACnet allows seamless integration and monitoring of other control systems. For Massachusetts General, Alerton used BACtalk to integrate a Simplex fire alarm system, which included smoke detectors and sprinklers.

The Alerton solutions installed in Massachusetts General's Building 114 were able to exceed expectations of the hospital's very precise requirements for their state-of-the-art research facility. Because of the multi-faceted nature of the building—research, administration, and academics—any control system had to meet the needs of multiple diverse zones within it.

BACtalk's graphical displays allow the facilities staff to view not only the entire system at a glance, but each component and its performance as well. The ability to monitor and override functions from a single workstation provides easy maintenance and simplifies training since new operators can see equipment on the screen without having detailed knowledge of each component.

Alerton also provided Acrobat® renderings of system drawings for Building 114, eliminating the need to physically carry them around the facility and campus. The click of a control button on the computer screen brings up a drawing pertaining to each piece of equipment, allowing operators to see how and where connections are made.

Since its unveiling in May 2001, Building 114 has not required any changes beyond its original installed system. As a result of this successful installation and overall system performance, Alerton will be considered the first choice in DDC equipment for future Massachusetts General Hospital projects.



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