



IMAGINON THE JOE & JOAN MARTIN CENTER | CASE STUDY

ImaginOn is a garden of technological delight for the young and young at heart.

ImaginOn: The Joe & Joan Martin Center is an entirely new type of facility that takes an innovative approach to education, learning and the arts—a collaboration of the Public Library of Charlotte & Mecklenburg County and the Children's Theatre of Charlotte. The 113,000 square foot facility features a theater, library, museum, science center, multi-media production studio and so much more to carry out the mission of bringing stories to life.

The Public Library of Charlotte & Mecklenburg County (PLCMC) and Children's Theatre of Charlotte (CTC) each offered engaging and educational programs for young people, but both were running out of space. The executive directors for both organizations decided to create a combined solution into a single, new facility. Just as passionate as their commitment to creating an engaging experience for children was the executive directors' dedication to making ImaginOn—the name for the new facility—a green building, taking waste-reduction measures during demolition and construction, and using energy reducing technology for ongoing operation. To assist with the heating, ventilating and air conditioning (HVAC) component,



The ImaginOn team made efforts to conceal as much equipment as possible to maintain the whimsical aesthetics inside the ImaginOn facility.

ImaginOn selected Hoffman Building Technologies, Alerton's North Carolina dealer.

Occupancy schedules inside ImaginOn are vastly different: although both the theatre and library are concerned with humidity issues, the theater is more focused on air distribution and mediating the varying temperatures between the stage and the audience seats.

There was a great deal of third-party devices to monitor through the HVAC system. In addition to chillers, transformers, and hot water systems, the facility also required integration with other building systems such as lighting control and fire/life safety.

Finally, unsightly panels and conduit have no place in a building designed to delight the eye as much as the mind. Aesthetics became a vital part in Hoffman's design for the mechanical system, and their biggest challenge would be to conceal as much equipment as possible.

"Nobody had ever built a building like this before in Charlotte—it's a frontier nobody had ever broached," said Brian Beavers, Director of Organizational Resources for PLCMC.

Hoffman installed a BACnet®-based energy management system (EMS) from Alerton that provides energy efficient operation, including occupancy-based HVAC control, carbon dioxide (CO₂) demand ventilation, lighting control and more. The ImaginOn project included global controllers, water-cooled chillers, water towers, boilers, chill and hot water pumps, air handling units (AHUs), and variable air volume (VAV) boxes. Alerton's Envision for BACTalk™ software serves as the front end of ImaginOn's building controls, managing all the functions and seamlessly integrating other third-party devices and systems.

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Inside the ImaginOn theater, engineers programmed the system to mediate varying temperatures and humidity.

Hoffman established sophisticated control strategies to effectively manage the varying heating and cooling needs of the library and the theater. These strategies include supply air reset control, static pressure reset control, and fan speed modulation based on airflow measuring. In addition to motion-based space sensors, ImaginOn uses precision controls to reduce its energy use and increase savings by ensuring no space is over- or under-ventilated.

ImaginOn features electronically commutated motors (ECM), a high-powered, brushless motor that has less energy loss than permanent split-capacitor (PSC) motors, thereby reducing a facility's energy consumption. An analog output on an Alerton unitary controller uses an ECM speed card to control variable air volume (VAV) box fan speed.

Hoffman also established interfaces to a packaged Bell & Gosset pumping system for secondary chilled and hot water systems. Piping is classic constant volume primary and variable volume secondary with differential pressure control. Onicon BTU meters are in the hot water and chilled water systems for energy measurement and verification (M&V) purposes. The meters are connected to the EMS, and energy consumption is trended for review and analysis.

Beyond peak efficient operations to help the facility achieve Leadership in Energy and Environmental Design (LEED) certification, ImaginOn building data had to be vigilantly tracked and verified.

There was a great deal of integration involved in the ImaginOn project. To begin with, Hoffman tied in York chillers using an MS/TP trunk off an Alerton BACtalk Integrator (BTI), a BACnet-based global controller. The chillers pick up between 40 and 50 points, which enables the trunk to generate a great deal of building data.

An integrated lighting control panel energizes lighting in a zone once it picks up an occupancy sensor contact. For additional control, an Alerton Microtouch unit offers a push-button override option if the motion sensor doesn't pick up the contact.

Hoffman also tied in CO₂ demand control ventilation (DCV). DCV controls the outdoor air intake, enabling the ImaginOn building EMS

to reduce the potential of over-ventilating a space during a period of low occupancy. The system still provides enough outdoor air ventilation, but decreases energy consumption in doing so.

One of the ImaginOn project requirements was for the controls contractor to provide power to the combination fire-smoke dampers. The fire alarm contractor provided a contact and a p-tap station for each damper. There was a great deal of work in placing and concealing the power transformers that power the fire-smoke dampers. Hoffman facilitated the coordination between the fire alarm contractor and the smoke alarm contractor to complete installation.

To maintain the whimsical look and feel of the ImaginOn spaces, Hoffman concealed as much equipment as possible. The architect was highly concerned with how conduit looked from the floor, so tasks included hiding conduit during the construction phase, integrating wireless sensors, and using perforated ceiling "clouds"—painted metal laths suspended in a t-grid—to hide air distribution ductwork. As a result, VAV boxes in the basement distribute air to spaces on the second floor.

Over the course of three months, Hoffman worked with Engineering Economics of Roanoke, Virginia, to commission the ImaginOn installation. The rigorous process included point-to-point testing of all control components—verifying, checking sequence, and proving sequences, safeties and system performance. The graphics package was also commissioned to ensure it displayed real-time data and was user friendly.

With the contributions from its Alerton energy management system, ImaginOn became the first public building in Charlotte and Mecklenburg County certified by the U.S. Green Building Council (USGBC). In 2006, ImaginOn was awarded Silver-level LEED certification, due in great part to the points earned by the energy efficient operation of its building automation system.

Today, the Alerton system successfully mediates temperatures inside the different areas inside ImaginOn, enabling the facility to continue to provide visitors with comfortably conditioned spaces in which to explore their imaginations.

"Completing ImaginOn really accented how you can construct environmentally and still create a building that's appealing to people not just from the United States, but from all over the world," Beavers said. "We have visitor requests every week from organizations here in the U.S. and abroad to come see this building because it appeals to so many people first on environmental standpoint and then an aesthetic aspect as well. The Alerton system is a component of that."

