Von Braun Center

CASE STUDY

Phase-I upgrades result in $35,728 utility rebate; five-phase project expected to save $300,000+ annually, with total life cycle savings estimated at $3 million+.

Challenge

Originally built in 1974, the Von Braun Center has doubled in size over the years with four major expansions, and plans underway for construction of another 150,000 sq ft of space. While the renovations have allowed the center to increase the activities it can offer, the additions have also contributed unfavorably to the performance of the facility's mechanical systems. Changing loads and capacity needs, and aging inefficient chilled water systems were challenges facing facility managers. In addition, with the facility's controls system not functioning properly, the only way maintenance personnel could control the chiller plants was to navigate across the complex to manually switch pumps and chillers on and off each day based on event occupancies, weather conditions, and hot/cold calls. Von Braun Center leadership sought to improve operational efficiency and comfort, while reducing energy consumption.

> "We started pre-cooling areas way before an event to ensure comfort. This was resulting in hours of chiller plant operation during unoccupied times and increased energy costs."
>
> - **Johnny Hunkapiller,** CEM, MPM, Director of Operations, Von Braun Center

"We were having major chilled water loop issues. Our chillers were supplying 43 degree water but couldn't get it to all areas of the complex. We decided it didn't make sense to replace existing machines until the chilled water system was corrected."

Solution

Evaluating systems, developing five-year upgrade plan

Based on a trusted equipment and service relationship that spanned nearly twenty years, Von Braun Center met with representatives from the local Trane office and engineering team to discuss their inefficient systems, water loop problems, and building controls frustrations. Trane and the Von Braun Center operations team evaluated the facility's systems. Approximately 36,000 gallons of water were being distributed throughout the complex by secondary and zone pumps to the complex's fifty-four various-sized air handlers at a constant volume. The team found air handlers with low return water temperatures; several cooling coil balancing devices inoperative; a section of chilled water piping installed incorrectly; and the constant volume distribution zone pumps

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Huntsville, Alabama

PROJECT HIGHLIGHTS

CHALLENGE

Variable loads and changing capacity needs

Inefficient chilled water and control systems

Comfort issue

High energy costs

SOLUTION

Variable primary chilled water system

Two 600-ton Trane® CenTraVac® centrifugal chillers

Chiller Plant Control software

Tracer® SC BAS and Ensemble™ building management system

RESULTS

$35,728 utility rebate

Upon completion of five-phase upgrade: $300,000+ annual savings projected; life cycle savings estimated at $3 million+

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all delivering maximum flow causing unnecessary pumping power and chilled water generation exceeding load requirements. Trane recommended changing the facility's constant volume system to a variable primary chilled water system, and replacing the three existing chillers, building controls and various components. With Trane's guidance, Von Braun Center prioritized projects, developed a five-phase plan, and moved forward with Phase-I upgrades.

Improving operational efficiency and comfort

Von Braun Center operations personnel visited the Trane plant in LaCrosse, WI, for further discussions with engineers regarding the variable primary flow system. The new configuration included replacing primary pumps in the South Hall, and removing primary and transfer pumps in the North Hall. To maximize savings, two variable secondary chilled water loops, one for the Arena and one for the South Hall, are controlled with differential pressure sensors located in the two secondary chilled water loops. The two flow meters are added together and the result is provided as a setpoint to the variable primary chilled water pump system. The primary is controlled to slightly exceed the secondary system with flow.

While at the Trane plant, the Von Braun Center team participated in a factory witness test to see their new Trane® CenTraVac® water-cooled centrifugal chillers being built. The two 600-ton chillers, featuring condenser water pumps and variable frequency drives (VFDs), as well as free cooling water-side economizers, were selected to replace the existing three chillers. To optimize operations, Trane BACnet controllers with factory designed Chiller Plant Control software control the plant at optimal efficiency, monitoring daily operations and providing advanced alarm notifications. Using the software, the chillers are staged based on temperature, with each individual chiller maintaining leaving water temperature and controlling its own load capacity.

Managing building systems with convenient access and control

A Trane® Tracer® SC building automation system (BAS) allows maintenance staff to respond to calls from anywhere within the facility using computer workstations or remotely with the Tracer BAS Operator Suite mobile app. The BAS is used to check outdoor air temperatures, change cooling tower setpoints, and provide colder condenser water to the chillers when conditions allow. Operations personnel use the Trane® Tracer® Ensemble™ building management system, with upgraded dashboard graphics, to monitor KW information, chilled water flow, chiller plant supply and return temperatures, condenser water pumps and cooling tower fan operations. Two 55-inch screens, installed in the foyer, display the chiller plant dashboards, allowing staff to view the current status of the chiller plant operation without needing to enter the locked mechanical room. The screens also provide an overview of chiller plant operations for guests touring the facility. Trane supports the Von Braun Center staff with monthly Tracer BAS users group meetings, which provide the opportunity to discuss issues and learn more about the system.

About Von Braun Center

Located in the heart of historic downtown Huntsville, the 483,000 sq ft Von Braun Center is a multi-purpose facility equipped to accommodate activities such as conferences, conventions, concerts, Broadway performances, ballets, symphonies, weddings, and a full range of sporting events, including hockey and basketball games. With more than 800,000 guests visiting the venue each year, the facility generates significant economic benefits for the area, while carrying out the center's mission to improve the quality of life for the community and surrounding area.

Results

Implementation of Phase I of a five-phase plan to upgrade mechanical systems at the Von Braun Center has resulted in a rebate of $35,728 from the Tennessee Valley Authority utility company. Upon completion of all five phases of the upgrade, considerable benefit will be realized in the form of energy savings, reduced labor associated with repairing/maintaining the cooling systems, better control of environmental conditions, and efficiency. Estimated yearly savings of the combined chilled water optimization are more than $300,000, with a total life cycle savings estimated at more than $3 million. "We have a 24/7 operation with typical peak loads occurring around 7 pm or 8 pm. One week we might have a heavy load and the next minimal. It took a lot of coordination by Trane to keep the facility running while upgrades were being done and equipment was being replaced," said Hunkapiller. "In Phase I, we addressed the heart of the building. While we've accomplished a lot, we are still at the tip of the iceberg. We are already noticing energy savings, and have found that we are now able to cool areas we couldn't before. It is exciting to be part of a forward thinking project and knowing the energy savings that will be achieved."

TRANE

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