



Mount Sinai Medical Center provides high quality health care to a diverse community through teaching, research, charity care, and financial responsibility.

CASE STUDY

Healthcare

Name

Mount Sinai Medical Center

Location

Miami, FL, USA

Facility size

2,000,000 ft² existing wing
350,000 ft² tower addition

Issue

Need for large, long-lasting and efficient chillers for improved cost savings and reduced maintenance

Solution

(3) 1500-ton Daikin Magnitude® dual-compressor magnetic-bearing chillers with RideThrough® and RapidRestore® technologies

Photo credit: www.nathnewellness.com

Daikin Chillers Selected to Save Millions for Renowned Hospital

Issues

Famous for patient care and its proximity to the pristine beaches of Miami Beach, Mount Sinai Medical Center embarked on a new patient tower to increase capacity and enable higher level care in a modern setting.

The largest independent non-profit hospital in South Florida began its expansion in 2016, overhauling outdated and inefficient HVAC systems and reconfiguring the central chiller plant with advanced HVAC technologies to match the cooling demands of the expanded footprint.

"We're adding 350,000 ft² to our facility and introducing almost two thousand tons of additional cooling capacity over the next few years," said Keith Liken, engineering maintenance manager at Mount Sinai. "We really needed a commercial HVAC system with a longer lifespan that will provide significant improvements in energy and cost savings, and fewer maintenance needs."

Well known for its research and academic programs, the medical center is also square in the path of extreme storms. The hospital's ability to provide innovative and comprehensive care in cardiology, neuroscience, oncology, and orthopedics is annually under threat of major storms and hurricanes.

During the summer of 2016, Hurricane Matthew threatened the region, impacting area hospitals and forcing many to evacuate patients. While Mount Sinai is known as one of the safest places in the area for storm shelter, the constant threat of natural disaster remains top-of-mind for building owners and facility management.

The construction project will completely change the landscape of Mt. Sinai, helping make it one of the premier hospitals in the country and demonstrating its commitment to patient care. Yet, the constant threat of natural disaster keeps leadership and the facility managers awake at night, making resilience against future storms a priority for the expansion and HVAC solution, along with energy efficiency and reliability.

"For a hospital in our location, weather can be a major issue," said Liken. "If we lose power, even for just a few seconds during a storm,



A rendering depicts the new patient tower scheduled for completion in 2018.

Photo credit: www.msnmc.com

the recovery process to bring our old chillers back online can take up to 40 minutes. In that amount of time, room and building temperatures increase significantly."

In addition to reducing the impact of power outages, the hospital is overhauling its central chiller plant's external structure to reinforce outer building walls, windows, and doors with materials that deflect strong winds and protect the building. Metal beams are also being installed to make it stronger and more resistant to hurricanes.

Solution

Mount Sinai selected three Daikin Applied 1500-ton Magnitude magnetic bearing centrifugal chillers to replace the outdated central chiller plant supporting the existing wing, and expand its capacity to account for the added patient tower. This advanced system can potentially boost energy efficiency by 40 percent as compared to standard centrifugal chillers, and save the hospital up to \$4 million over the life of each unit.

"Before deciding on the Magnitude chillers, we conducted an extensive lifecycle cost comparison against other equipment providers," said Liken. "As part of this analysis, we calculated efficiencies of the system on part loads and found we will save hundreds of thousands of dollars per year compared to the chillers we replaced."

The oil-free design of the Magnitude chiller means the equipment will also require less maintenance. The magnetic bearing technology eliminates oil, mechanical seals, and gears for longer machine life and better reliability. Oil-free systems also perform more efficiently because there is no efficiency-robbing build-up of oil on heat-transfer surfaces.

"In addition to efficiency of the chiller itself, the Magnitude equipment also helped improve overall plant operation efficiency," said Sam Frasier, vice president at Moses and Associates Engineers, Inc. "The Daikin equipment made it easy to convert the plant from a primary-secondary to a variable-primary configuration. This configuration makes it possible to take advantage of the superior part-load performance and significantly reduced pumping power."

Another benefit of the upgrades to the facility's central chiller plant system is the ease of bringing the chillers back online if power is lost during a storm; in some cases, the chillers will continue to run without shutting down at all. This is made possible by Daikin's unique RideThrough® and RapidRestore® technologies. RideThrough technology enables chillers to maintain stable operation during momentary power loss lasting up to five seconds, ensuring no loss of cooling capacity. If an outage lasts longer than five seconds, RapidRestore can restart chillers in as little as 43 seconds once power is restored, reaching 80 percent load cooling capacity in less than 75 seconds. These capabilities can be performance savers to mission-critical facilities like Mount Sinai Medical Center, especially when located in storm-prone areas.

Outcome

While the construction project at Mount Sinai and implementation of the three Magnitude chillers is still in progress, the hospital has already started seeing the benefits of this new technology.

Two of the three Daikin chillers are currently up and running, supporting the load of the existing square footage, along with old equipment that has not yet been taken offline. The third Daikin chiller is available for use in emergency situations and all three chillers will be up and running in June, 2017, to support the entire campus.

All three units fit neatly into the revitalized chiller plant, which was a key consideration and point of emphasis throughout each project phase. The project called on the expertise of KAR & Larrabee Mechanical Contractors, Kerney and Associates, Inc., and Daikin Applied's South Florida team.

"One concern while planning renovations for the chiller plant was the limited space available for new equipment," said Frasier. "The 1500-ton Magnitude chillers with dual compressors are the only high-efficiency magnetic bearing chillers able to provide the capacity needed given the



The 1500-ton Magnitude chillers will provide the hospital with hundreds of thousands of dollars in cost savings each year.

allotted space, and there still remains additional room for new equipment that might be needed in the future."

Results of the lifecycle cost analysis also validated the overall value of the purchase, allowing Liken and his team to use the savings realized to cover the cost of an additional generator, which will come in handy during any weather-related power outages.

"...we will save hundreds-of-thousands of dollars per year, as compared to the chillers we replaced."

Keith Liken, Facilities Manager, Mount Sinai

Liken adds, "A few years ago, I suggested at an industry event that someone should consider developing large magnetic bearing chillers for those who want to realize the benefits of this technology, but need equipment for very large campuses. It's obvious that Daikin is responding to the market, and filling voids through innovation and advanced technology like no one else."

Mount Sinai is looking forward to having the new construction project complete, providing the building with a state-of-the-art central chiller plant that's more spacious, quiet, and resilient to storms. Once all three Magnitude chillers are up and running, Liken and his team plan to monitor energy usage and maintenance needs in order to compare them to the old chillers, demonstrating the significant ROI they're expecting to see over the life of the equipment.

To sum up their decision, Liken said, "We decided to go with Daikin because we wanted to do what's right for the hospital for the next thirty years, not only the next five or ten."