



Energy Saving Solution

CASE STUDY

VIRGINIA TECH

PROJECT NAME: Biocomplexity
Institute of Virginia Tech

LOCATION: Blacksburg, VA

TYPE: Data Center

BENEFIT: Zero performance loss switching from water to Hydromx nanofluid with freeze protection

BACKGROUND

The Biocomplexity Institute at Virginia Tech was founded in 2000 to solve the world's most complex problems. The Institute's modeling and simulation research require a state-of-the-art data center.

This data center comprises 200+ teraflops, 8600 CPU cores, and 45TB RAM of computing power, which generate a significant amount of heat. These servers are cooled by three CRAC units and nine chilled door racks, all of which now employ Hydromx as the heat transfer fluid to reject the heat from the space.

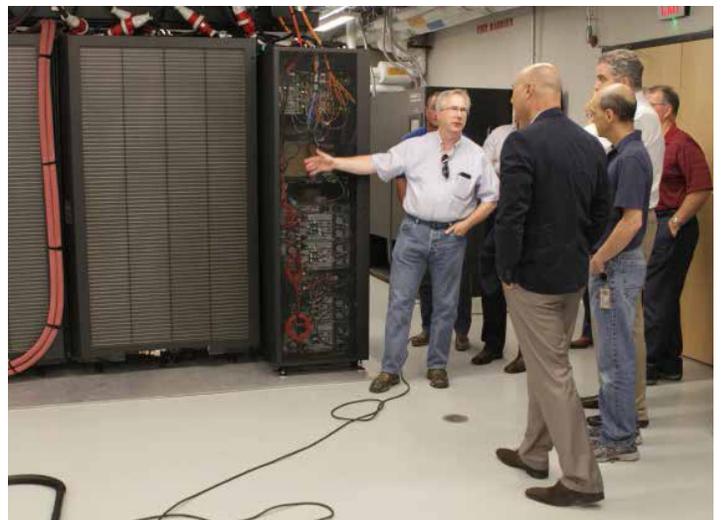
“ENABLING [THE DATA CENTER] TO USE HIGH-DENSITY EQUIPMENT FOR THE ADDED LOAD WITHOUT BEING PENALIZED BY GLYCOL'S DERATING PROPERTIES.”

The Hydromx fluid loop is cooled by campus chilled water through a heat exchanger for most of the year. During the shutdown season for the campus chilled water, the Hydromx fluid loop rejects the heat through a roof-mounted dry cooler. The Biocomplexity Institute owns and manages the system; and, thus, is intimately involved with the analytics behind optimizing the equipment via their building automation system.

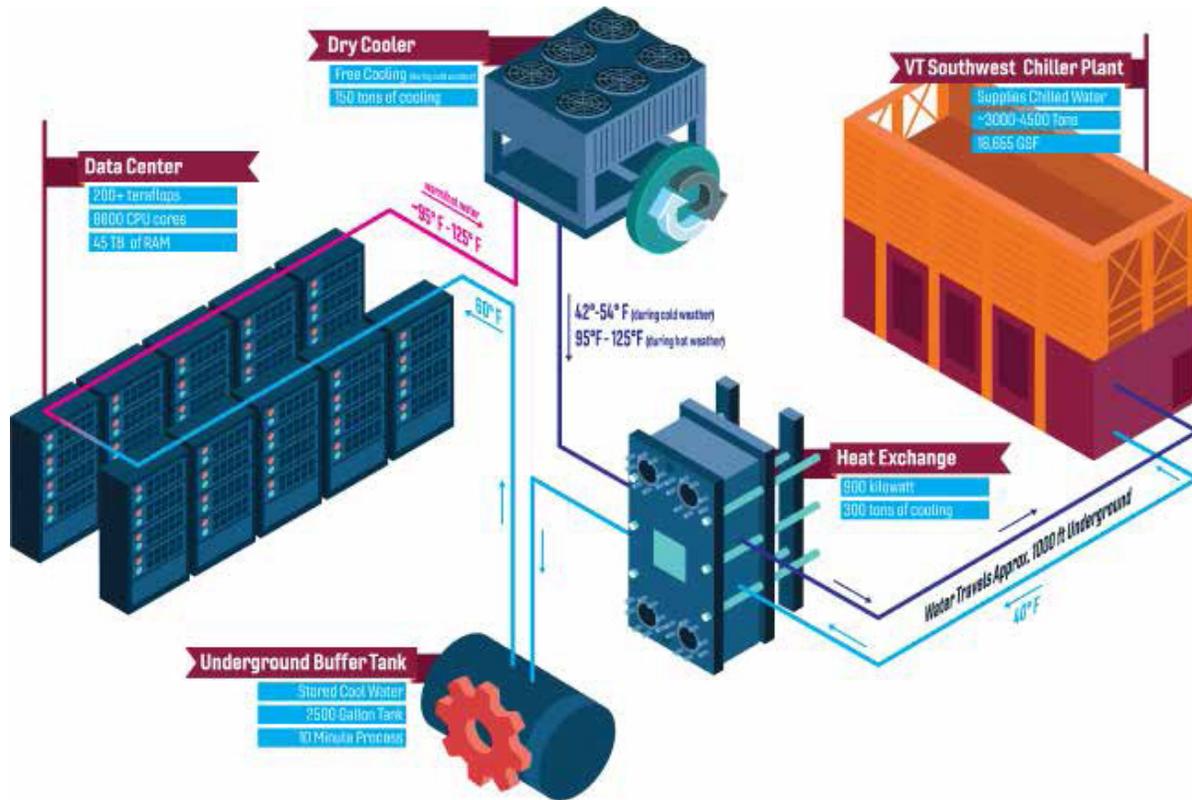
CHALLENGE

In 2017, the Biocomplexity Institute outgrew its data center and needed to retrofit a plant-growth lab into a data center quickly and within budget. To expand and make the most of the retrofit space, the Institute was challenged to reach a solution that would respond to the added heat load and space constraints. NASA kindly provided gently used high-density 50 kW chilled-door racks to overcome the problem. However, these racks were designed to run with water, not glycol.

This presented a significant challenge due to the project's -20 °F freeze protection requirement. Glycol's natural derate coefficient negatively affected high-density racks' capacity. After receiving the recommendation from the Oak Ridge National Laboratory and advice from the design-build team, the facility managers selected Hydromx for its combination of improved thermal performance compared to water and its superior freeze protection properties.



Hydromx's nanotechnology allowed Virginia Tech to come in under budget by allowing them to reuse existing equipment.



SOLUTION

In December 2017, the Institute switched the data center closed-loop system from water to Hydromx.

“We selected Hydromx due to its reported stability and our performance expectations for the Motivaire chilled doors,” says Joseph Hoeflein, director of facilities and research operations for the Fralin Life Sciences Institute at Virginia Tech. “A local laboratory tests each loop quarterly. Following startup, sock filters in the loops have consistently remained clean. The freeze point has ranged between -23 and -30 °F. The glycol concentration has ranged between 45–48%.”

RESULTS

“We have been very pleased with the performance of these cooling loops and see no evidence of metals degradation,” Hoeflein says. Hydromx allowed the Institute to solve the problem and come in under budget by enabling it to use high-density equipment for the added load without being penalized by glycol's derating properties.

The Institute's new data center is a model of efficiency. The Institute was able to design its new space to handle increased loads and projected growth and repurpose existing cooling equipment for the additional load.

ABOUT HYDROMX®

Hydromx® is a nanotechnology heat transfer fluid that saves a significant amount of energy. Hydromx® ethylene-based or propylene-based fluid outperforms not only other glycols, but also outperforms water. Hydromx® has been proven in multiple installations to save 20–35% energy in heating and cooling systems around the world.

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