



Victory Technology Center

The Pursuit of ROI

Victory Technology Center of Buffalo, NY was initially designed as a dedicated data center to support Catholic Health, Western New York's second largest multi-hospital healthcare system. The design firm MDC Solutions was brought on to retrofit a recently closed hospital into a data center to meet the healthcare system's rising technology demands.

Mike DiGiore, President of MDC Solutions, recalls the first phase of construction, "At the time, traditional forced air was the mainstay of data center cooling. So, the first suite was designed using these methods." With this traditional design, came the traditional obstacles of ductwork, raised floors, humidity control, and a host of other maintenance issues.

With the completion of Phase I, DiGiore recognized the potential of the remaining space. The new center had nearly 36,000 square feet remaining, including office space. This large amount of unused space meant huge profit potential if refitted as a colocation facility for Catholic Health. "We basically had a blank canvas to work with. So, with Phase II construction, we were determined to improve the second suite design to optimize the new colocation space and profitability," said DiGiore.

Enter The OptiCool Solution

"At the time of Phase I construction, OptiCool Technologies' refrigerant-based cooling system had not yet been perfected," said James Pluta, Director of Facilities. "Luckily, by the time of the Phase II design, the planets essentially aligned for us," added Mike DiGiore.

With the availability of OptiCool's cooling solution, construction of the new colocation footprint centered around the innovative new design. OptiCool's refrigerant-based cooling dramatically transformed the design and efficiency of subsequent VTC suites. Elegant simplicity is the key. Unlike airflow cooling, OptiCool provides close-coupled cooling at the heat source, providing a wealth of advantages including energy usage reduction by up to 90%.

OptiCool Technologies

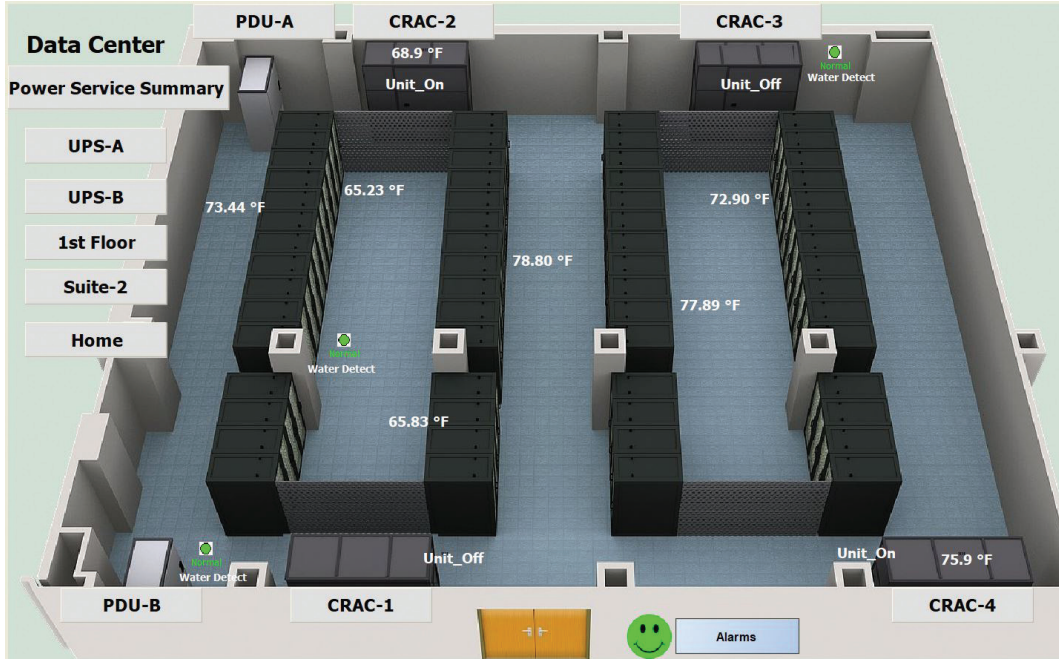
Sales: 585-347-6142 Service: 585-453-2014 eMail: info@opticooltech.com Website: opticooltechnologies.com



OptiCool vs. Traditional Airflow Cooling

A unique aspect of VTC's project evolution was the ability to make side-by-side comparisons of the two cooling solutions and their impact on design and efficiency:

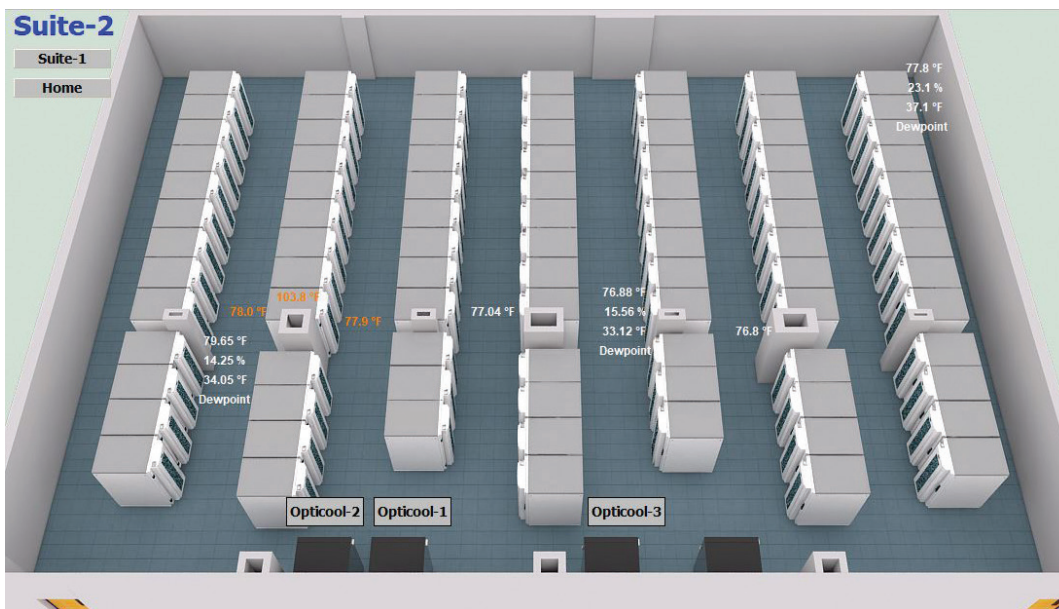
Suite 1 Traditional Cooling



1 OptiCool Pump = 3 Traditional CRAC Units.
A side by side comparison.

Use of Valuable Floor Space
Each CRAC unit is 6' wide x 3'deep x 5' tall = **54 total ft²**

Suite 2 OptiCool System



One OptiCool pump is 2½' wide x 2'deep x 5' tall = **5 total ft²**

Total floor space saved = 49 ft²
\$185,000 Savings
(dollar value based on colocation revenue)

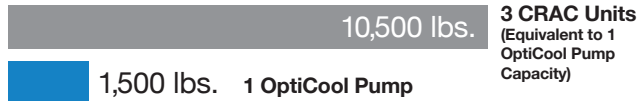


Weight Displacement & Floor Reinforcement

One CRAC unit weighs 3,500 lbs. x 3 = 10,500 total lbs.

One OptiCool pump = 1,500 lbs.

Weight Displacement



Total weight saved = 9,000 lbs. or 4 tons.

Result: No floor reinforcements necessary = Significant Cost Savings

Energy Usage

One CRAC unit draws 60 amps x 3 = 180 amps

One OptiCool pump = 20 amps

Energy Usage



Total amperage saved = 160 amps

Total energy savings = \$10,516.20 per month

Rebates: VTC was able to acquire \$68,000 in energy rebates, which is equivalent to 25% of their initial investment. They will be eligible for additional rebates as the business grows.

Service & Maintenance Expenses

CRAC unit requires (SLA) Service Level Agreement \$1,700 – which is not needed with the OptiCool System resulting in a \$1,700 savings.

Rack Density & Cooling Efficiency

Traditional Suite

Ambient Room Temperature = CRAC set at 70°

- Cold aisle = 64° in one corner, 65° in another corner
- Hot aisle = 80°

CRAC units cover a region with the hope that cool air is being drawn into the cabinets equally which takes an educated guess on how much air needs to be pumped in.

OptiCool Suite

Ambient Room Temperature = set at 78°

Sensor placement on highest density cabinet.

- Temperature incoming = 75.6°
- Temperature inside cabinet = 102.5°
- Temperature outgoing = 72.8°

The OptiCool Solution is unit specific and is quantifiable as to how much heat is being removed at the source.

Result: OptiCool's scalable solution keeps room temperatures neutral by removing heat directly from multi-density racks.

Total Operating Costs – The Big Picture

The OptiCool Suite has twice the capacity of the Traditional Suite. You would expect the operating costs to be double the Traditional Suite but because of efficiencies and substantially lower energy usage it operates at a fraction of the cost.

Total Operating Costs



Result: The OptiCool Suite costs 2/3 less to operate.



The Secret to the OptiCool Design

What makes the OptiCool system so efficient and effective is R134a, a non-toxic, synthetic refrigerant. R134a has superb thermodynamic properties, which make it an ideal medium for moving heat. The R134a is distributed through OptiCool's refrigerant distribution unit (RDU). There is no compressor on the RDU, rather a small electric motor that is coupled to an impeller. The impeller circulates the liquid R134a through the refrigerant distribution network (RDN). The RDN is a series of small diameter copper pipes that extend over the cabinets. From the RDN, the liquid R134a flows through flexible stainless-steel hoses that connect to active heat extractors (AHX). AHXs are mounted on the rear doors of each cabinet.

The AHX units are essentially small Heat exchangers with fans. Up to three AHX units can be installed in a single cabinet. The AHX fans pull hot air from the servers through the units. The heat is absorbed into the R134a liquid, which "flashes" into gas via a phase change. The heated gas flows through an RDN return pipe to the heat exchanger in the RDU. The refrigerant condenses into a liquid state and is pumped back to the cabinets to repeat the process. The RDU requires only 1.5 horsepower per 250 kW of cooling, which is about the same power needed to run a residential sump pump.

Final Thoughts

The OptiCool solution is far superior to any that I've ever encountered," said James Pluta. "Our Service Techs are saying 'this can't be that simple!' and yet it truly is." From a single cabinet in a shared colocation environment to a dedicated hard-walled suite, VTC is dedicated to offering custom solutions to their clients. "The OptiCool solution has become a major component in doing just that," said DiGiore.

"When clients enter the new suite where the OptiCool Solution is deployed, they think of Star Wars, they think of the future," said Mike DiGiore. "They see the white doors and cabinets, the superior use of floor and overhead space – they basically see a model of design and efficiency".

OptiCool's patented Cool Door system attaches directly to any third-party rack, supporting a variety of heat loads and redundancy configurations. "Hot aisle containment, humidity issues and condensation, high pressure and low-pressure zones – these issues are all solved," said Pluta.

The average life span of a typical CRAC unit is 15 years. VTC is currently in their 10th year. "We anticipate retrofitting suite one to OptiCool in about five years" said DiGiore. "The future of data center cooling is here today and with great confidence, we have put our future in the hands of OptiCool."