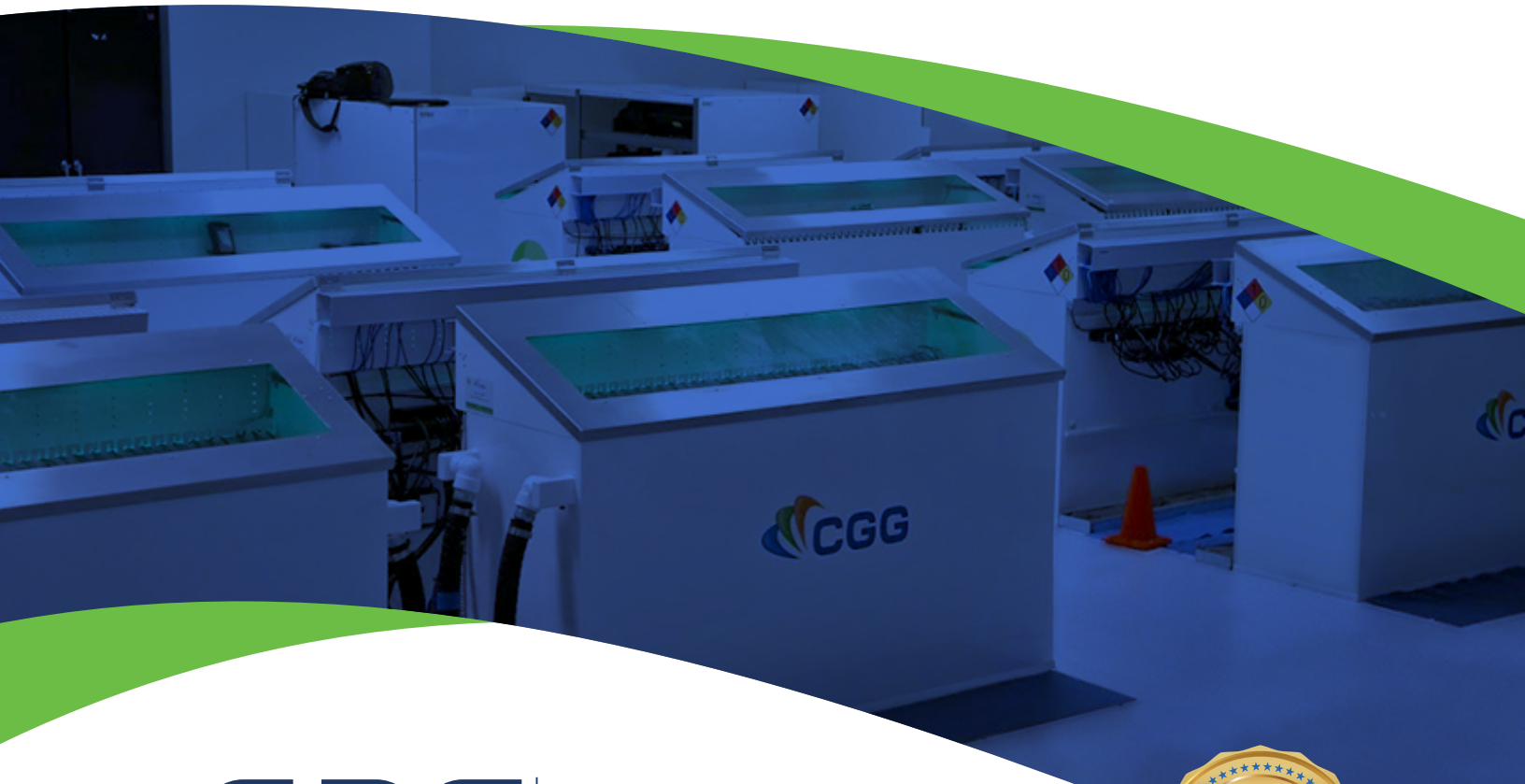
GUIDE

Guide to Floor Space Optimization with GRC

Learn How We Are Improving Data Center Space Utilization

An analysis of how Green Revolution Cooling's (GRC) technology can help improve space utilization in server rooms, allowing for less infrastructure, denser layout, and denser racks.



GRC GREEN REVOLUTION COOLING

The Immersion Cooling Authority

10 YEARS

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Introduction

Floor space usage in the data center is an important consideration, whether planning a retrofit or a greenfield build. There are a number of ways floor space utilization is measured for data centers: Watts per square foot, servers per square foot, square feet per rack, etc. This guide will explore how the ICEraQ™ micro-modular, racked-based cooling solution is able to save valuable floor space in the data center as compared to traditional architectures.

More Compute per Square Foot

While it is true that a horizontal rack has a larger footprint than a conventional vertical rack by itself, this does not necessarily translate into higher space requirements for the complete data center. In fact, when looking at the fully burdened footprint (including aisle space, and supporting infrastructure like power, backup, and cooling systems) the ICEraQ can improve the space utilization of a traditional data center in terms of watts per square foot, servers per square foot, and even square feet per rack.

Further, because the ICEraQ also reduces the power drawn by the IT equipment itself, it is able to support more computing power for the same amount of watts per square foot. For example, assuming that a standard server draws 350 watts of power, a traditional data center with a rack density of 6 kW per rack would support 17 of these servers. The ICEraQ on the other hand, can reduce the same server's power rating by up to 20%. So if the server were to draw only 280 watts, the same 6 kW per rack would support 21 servers, that's an increase of 25% in computing power without any increase in rack density or power consumption.

In addition, the ICEraQ not only supports higher rack density but also a tighter layout and simplified infrastructure, all of which help further improve the space utilization in the data center.

Less Infrastructure

The ICEraQ, completely eliminates the need for large CRAC or CRAH units, while significantly downsizing the needs for backup generators, UPS and batteries, etc.

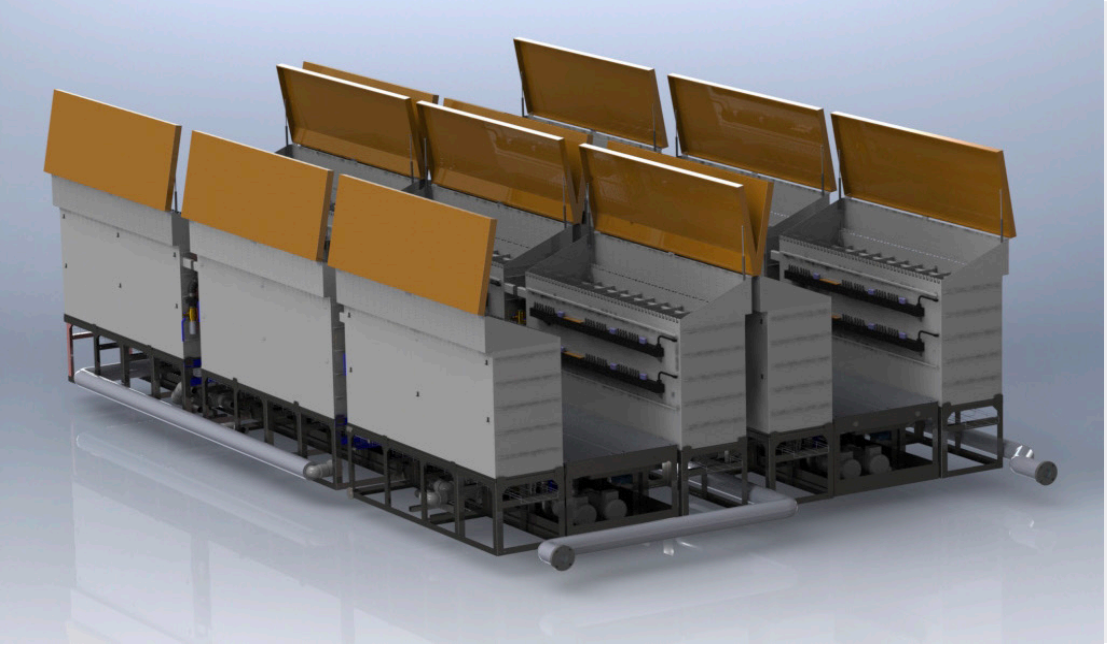
GRC's technology reduces the power drawn by servers and that needed for cooling. This reduces the overall electrical power rating of the complete data center, for the same amount of computing power. The elimination of bulky CRAC and CRAH units along with the downsizing of power and backup infrastructure helps save valuable real estate both inside and outside the data hall.

ICEraQ

- ☑ Liquid submersion rack
- ☑ Pump modules (QTY 1 per 4-8 racks)

Air Cooling

- ☑ Air-cooled rack
- ☑ Air handlers
- ☑ CRACs
- ☑ Chillers
- ☑ Additional Generators/UPS/Batteries



Low profile pump module covered with tiles to double as a walkway

Further space savings can be found through the use of the low profile pump modules offered by GRC. These pump modules can be installed under existing raised floors or directly on a concrete floor. If installed on a concrete floor, the modules can be covered with tiles to double as walkways, creating a raised floor without the additional labor, costs, or complexity.

Denser Layout

The ICEraQ are installed back to back and end to end next to each other. There is no space wasted in creating hot and cold aisles, so every alternate aisle in a traditional layout can be eliminated completely, packing in the racks closer to each other without concerns of serviceability or thermal management.

Denser Racks

The ElectroSafe™ coolant used in the ICEraQ has 1,200 times the heat capacity of air, i.e. it takes 1,200 times the heat to raise its temperature by 1˚C. This higher heat capacity means that servers can be packed in closer to each other without concerns of heat transfer between them.

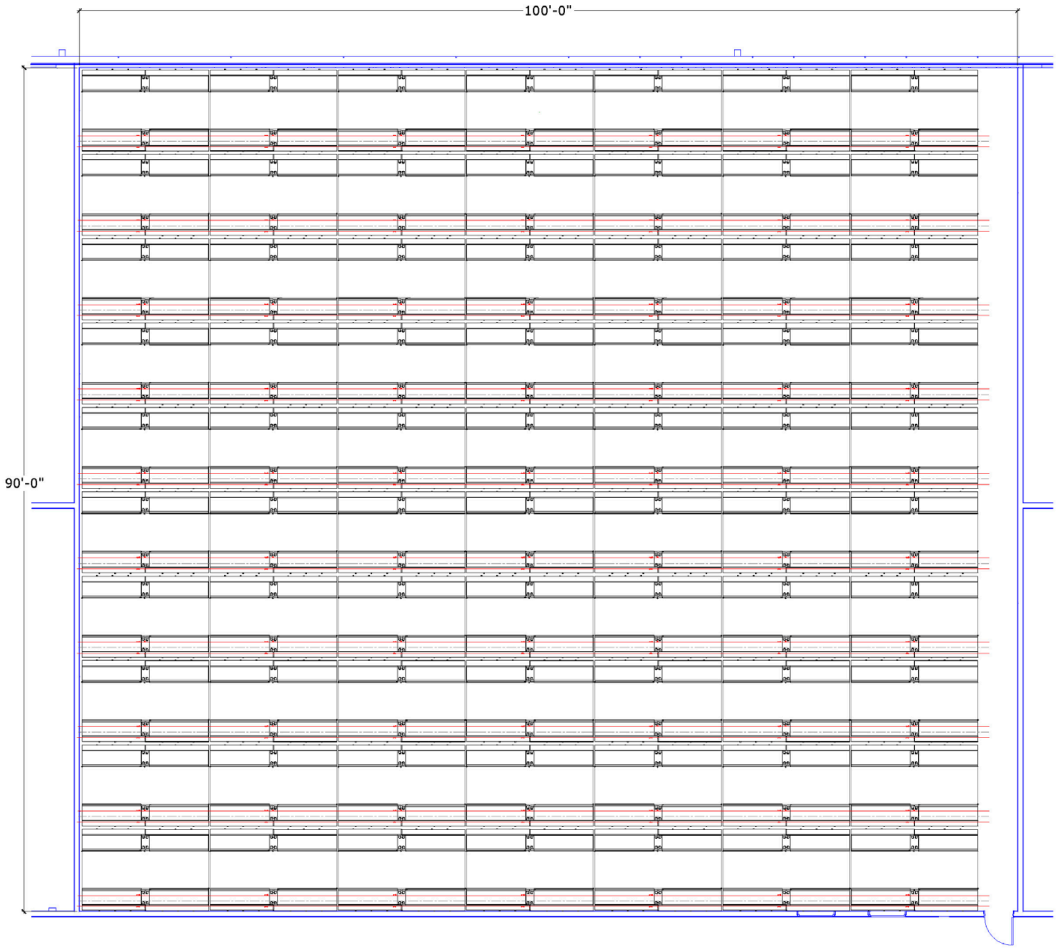
Further, since the bulky cabinets and chassis fans are not needed, denser server layouts are possible. Densities of 60 kW/rack are not uncommon with the ICEraQ, and can be increased to as high as 100 kW/rack. This is significantly higher than the average 5.8 kW/rack seen in traditional data centers[1].

Back to back racks eliminate every alternate aisle

Sample Layout

The following drawing is an example of a typical layout of the ICEraQ racks, in a 9,000 square foot data center. The 90' x 100' data hall packs in ten rows of seven quads (collection of four racks and a pump module). That's QTY 280, 42 U racks with 70 low profile pump modules functioning as walkways.

Sample layout with ICEraQ



Total Area	9000 sq ft.
Number of Racks	280 racks
Effective Rack Footprint	32.14 sq ft/rack
Server Capacity	1.14 U/sq ft.

The 9,000 square feet, in this example can support over 14 MW of computing capacity, depending on the rack density. The table below shows the possible IT load and the power density of the data center at various rack densities.

Rack Density	10 kW/rack	20 kW/rack	50 kW/rack
IT Power	2.8 MW	5.6 MW	14 MW
Power Density	311 W/sq ft.	622 W/sq ft.	1556 W/sq ft.

This is significantly higher than the average 100 – 200 Watts per square foot seen in traditional data centers[2].

Conclusion

GRC's technology can help data centers get more from less. With the ever growing demands for computing power, more and more data centers are beginning to become capacity constrained. Our ICEraQ can not only optimize resource utilization today but, support virtually unlimited rack densities, that can prepare the data center infrastructure for the needs of tomorrow as well.

References

[1] Emerson Network Power, (2013). Average Power DensityHolds at 5.94 kW. [online] Available at: 1. http://www.emersonnetworkpower.com/en-US/ Solutions/infographics/Pages/graphicoftheweek18.aspx [Accessed 7 Aug. 2014].

[2] Collins, J. W. (2013). Efficiency and Density-Boosting Upgrades forthe Modern Data Center. p.2.

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To Learn More About How GRC Can Help
You Maximize Capacity at Your Data Centers

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