Opengate data systems

Intelligent, Distributed Power & Cooling™

Case Study - AAFC Reclaims Wasted Cooling

Agriculture & Agri-Food Canada (AAFC) Winnipeg Keeps Pace with Aggressive Data Center Growth Demands by Reclaiming Wasted Cooling

CASE STUDY | EC8002A
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www.nerdata.com 888.637.3282

AAFC Winnipeg Data Center is Meeting Aggressive Growth Demands

The challenge for AAFC's data center services was to grow approximately 40% with limited infrastructure investment. The Opengate Containment Cooling systems enabled AAFC to quickly meet aggressive growth demands on data center services that were previously not possible given the center's cooling infrastructure. Opengate's ability to actively manage rack airflow, with redundant fans and a secure Web server to email alerts and provided metrics, was significant in enabling intelligent cooling decisions. This in turn enabled higher power-density racks and increased cooling efficiencies throughout the data center.

AAFC Reclaims Wasted Cooling

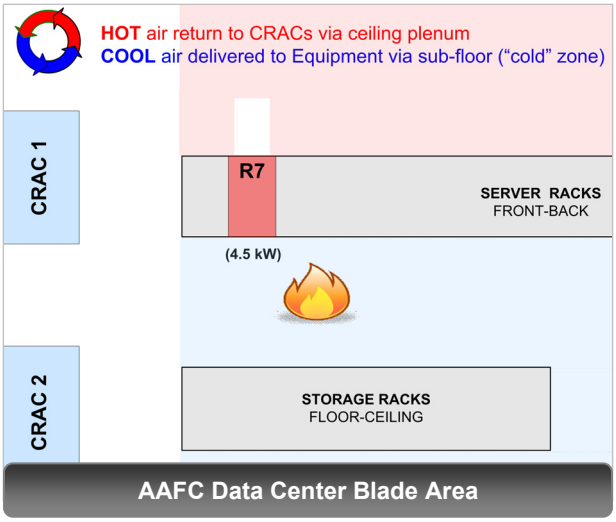
AAFC's Winnipeg Data Center

AAFC Winnipeg is their second largest AAFC computer facility. AAFC Winnipeg is aggressively increasing IT load and expecting to continue this trend over the next several years. However, the data center, implemented almost 20 years ago and with only a 6-inch raised floor, is currently operating beyond its designed load. Efficient use of the current cooling resources through *best practice* airflow management was helpful, until recently. AAFC Winnipeg desired to further improve airflow efficiencies on a couple of racks targeted for higher-power densities.

Attempting to Deploy More IT – Fall of 2009

With the existing cooling infrastructure, the AAFC Winnipeg data center was unable to deploy blade servers without causing server temperature alarms and intake temperatures greater than 30 ºC (86 ºF). A single passive rack chimney was placed on one rack with a ducted exhaust to the ceiling plenum. This further exacerbated these conditions even though the rack was outfitted with solid rear doors, bottom and top panels, as well as some manufacturer-provided weatherstripping.

Blade Chassis Overheating Issue – After approximately 48 hours of operation, blade chassis #2 (with a 4.5 kW load in R7) had to be shut down due to excessive local heat problems and increased temperatures throughout this region of the data center.



Detailed observation showed Rack R7 leaking a large percentage of hot air out of the rack due to high rear-rack plenum pressure. Multiple and parallel server air streams, all merging in a tight space, could not be expected to evacuate the passive rack chimney without building localized pressure and resulting in hot air leaks. A local helper fan would be required to remove the rack back pressure and resulting thermal issues.

Deploying More IT with Just One Opengate Containment-Cooled Rack

The Opengate Containment Cooling system converted Rack R7 from a passive rack to a dynamic active rack. AAFC decided to go with the Opengate system with its redundant fans and ability to automatically control airflow through the rack, while ensuring a zero-pressure environment inside the rack. The other **Opengate benefits include; the ability to remotely monitor cooling capacity, log IT equipment intake heat and humidity, and set up email alert thresholds to multiple alert groups.**

AAFC simply removed the metal duct and replaced it with the Opengate system, all while two-blade chassis in Rack R7 remained operational.

The ceiling was trimmed for the Opengate exhaust duct, which was half the depth as the prior duct. AAFC was confident the servers would operate more efficiently by reducing back pressure and ensuring that no hot exhaust bypassed the chimney, finding its way back to the front of the rack.

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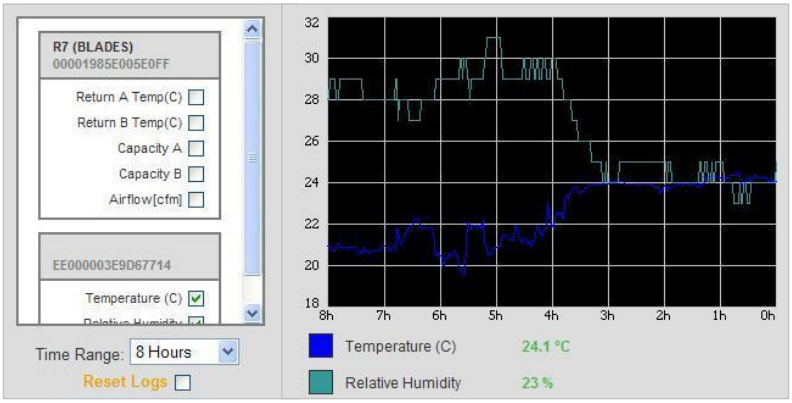
Powering Up the Blade Server Chassis

With the Containment Cooling system installed, AAFC emulated full power to blade chassis #2 in Rack R7, resulting in an operating third blade chassis without temperature alarms. In addition, AAFC observed that the:

• Opengate temperature graphs showed the exhaust heat increase steadily as expected to 35-36 ºC (95-97 ºF) at the Containment Cooling duct exhaust. 23 ºC (73 ºF) was maintained to the rack intake at all heights.

• Data center temperature was acceptable. Eye-level readings at each rack varied from 19.5 ºC (66 ºF) to a high of 25 ºC (77 ºF). The exception was Rack R19 (with the other blade chassis), which was near 27 ºC (81 ºF). Neighboring racks on either side were at 25 ºC (77 ºF).



More IT Deployed into Opengate Rack R7

To take advantage of the actively managed containment system, a blade chassis was moved from Rack R19 to the Opengate Containment-Cooled Rack R7. This assisted overall data center cooling by increasing the power density in the successful Opengate rack and reducing 4.5 kW of heat load from Rack R19. The most important findings and benefits were the:

• Ability to operate all three blade chassis in Rack R7

• Opengate's metrics once again proving invaluable for deploying more IT load

• Reduced mid-room intake temperatures a few degrees near Rack R7

• Timely enabling of new virtual servers in Rack R7 while keeping rack temperatures stable

"Today we have 75% of our IT heat load being managed by Opengate Containment-Cooled racks. We can maintain stable intake air temperatures everywhere, no hot spots and no rack pressure causing hot air leakage."

– Eric Swanson, Agriculture & Agri-Food Canada

Main Benefits of Opengate Containment-Cooling Deployment at AAFC

- ✓ Aggressive growth demands with limited infrastructure investment
- ✓ Fiscal responsibility with environmental leadership
- ✓ 40% increase in data center load without hot spots or airflow problems
- ✓ Intelligent cooling decisions with a secure Web server to email alerts and provided metrics
- ✓ Maximized IT and real estate resources in a 20-year-old data center with a 6" raised floor
- ✓ Efficiency gains and reduced wasted cooling by raising supply air temperature
- ✓ Ability to utilize existing Glycol-cooled DX CRAC units at the floor perimeter

AAFC Reclaims Wasted Cooling

Knowledge Transferability

AAFC can apply the significance of a managed containment-cooled system, with load and environment metrics, to **make intelligent cooling decisions** in other data centers:

- ✓ Increase utilization of existing cooling infrastructure
- ✓ Deploy higher-density racks with confidence, success, and without confusion
- ✓ Valuable remote real-time monitoring of temperature and humidity across the data center
- ✓ Achieve high-density rack deployment with a traditional cooling infrastructure
- ✓ Achieve immediate benefits of rack deployment and reduction in data center energy consumption
- ✓ Achieve load increase and energy savings with a lower-than-desired raised floors
- ✓ Significant savings – Ideal for infrastructure and energy cost reductions

Data Center Services Expansion with Limited Resources

The Opengate Containment Cooling solution excelled even with AAFC's congested low-raised floor environment, and proved invaluable in allowing AAFC to understand airflow-related dynamics necessary to optimize AAFC data center operations.

AAFC Containment-Cooled Racks

Just a few Opengate containment systems enabled AAFC to meet the most recent growth demand through effective use of cooling resources. The information provided through the Web server metrics and alerting features has proven to be as valuable as the automated airflow management. Many IT resources have access to the data center (physically and remotely) and it doesn't take much to change the dynamics in a rack or the data center. For example, remotely powering blades on or off normally has a significant impact, but it's not an issue with the active (automated) airflow management.

Fiscally Responsible Environmental Leadership

Applying innovative products like the Opengate containment solution on a large scale will **increase future savings through a more efficient and actively managed cooling system**. This will ultimately work towards reducing cooling infrastructure costs required for AAFC's rapidly growing data centers (lowering space, procurement, maintenance, and power costs).

Eric Swanson is the IT Site and Data Center Manager for Agriculture & Agri-Food Canada, with over 20 years experience with the Government of Canada managing large network environments with strong security and availability requirements. Eric is also an experienced team lead for a national work team, with membership distributed across Canada.

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Build with Confidence

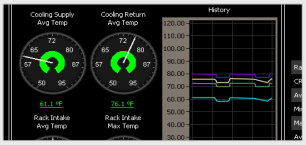
"Opengate's ability to actively manage rack airflow with redundant fans, a secure Web server for alarms, and other provided metrics was significant in enabling intelligent cooling decisions."

*– **Eric Swanson, Agriculture & Agri-Food Canada***

Deploy More IT with Confidence

Unity Cooling®

Automated Cooling Circuit Control & Management

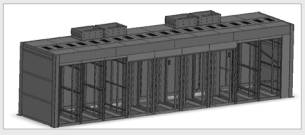


SiteView™

Data Center Management System

IT-Row™ Cooling

Automated Row Heat Containment



SwitchAir™

Network Switch Cooling