

Data Centres – who knows what really goes on behind those doors?

Data centres have become very volatile environments. High density heat centres, dynamically changing heat patterns and constantly increasing power consumption of servers, requires constant monitoring to avoid problems. The occasional walk through of a data centre is no longer enough to identify potential problems. Assuming heat problems can be avoided by throwing more cool air into the room is not an effective long term strategy with increasing energy costs and power limitations in many areas.

But what can you do?

“The ability to simultaneously see the temperatures graphically, in real time and throughout the room makes the proposition of fine-tuning the raised floor to eliminate wasted cold air and eliminate hot spots nothing short of phenomenal.”

Dennis Kniery, CFM

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Data Center – White Paper

The maxim of ‘ You can’t manage what you don’t measure’ is a truism in data centres operation. Traditional approaches to operating a data centre are no longer viable. Dramatic changes in IT equipment has turned the data centre into a dynamic and dense heat centre with ever changing demands. Static cooling management no longer meets the needs of the wide ranging IT equipment housed in one facility. Older low end equipment can still operate quite well with limited cooling, but high end virtualized servers and blade servers need special attention. But in many cases these specific needs aren’t being met – generally because the needs are not being properly identified. Operating a data centre to the lowest common denominator just isn’t economically feasible anymore.

So what can be done? This white paper outlines strategies that companies can use to improve the operating environment of their data centre, reduce costs and be assured that they providing optimum conditions for their critical IT equipment.

The dynamic nature of today’s data centre

Data centres have become a key strategic asset of most companies. A properly maintained and managed data centre can be a competitive advantage for a company. Yet many companies treat data centres as a necessary evil. They become storage rooms for boxes and unused equipment. Temperature management is one or two sensors on the wall. And as long as the air conditioning is running full out, 24 hours a day, all is assumed to be good.

Management by walking about a data centre is not an effective means of knowing what is going. Daily or twice daily snapshots of the data centre heat profile is a plan for failure in today’s dynamic centres. Virtualized environments have a continually changing heat profile that can change dramatically within minutes as applications come to life or shut down. All may be good in the data centre at 8:00 am, however by 10:00 am the heat load of a virtualized server can increase 3-4 times resulting in hot spots and equipment overheating that isn’t readily detected in a walk through.

Running a data centre requires a holistic perspective that takes into account everything that is going on within the centre, on an on-going, real-time basis. Blade servers offer great processing power in a small space, however the heat generated must be dealt with carefully. Not so long ago a typical rack of IT equipment would consume 2kW of power. Today it is not uncommon to have a partial racks of blade servers consuming 14kW of power – a 7 times increase in heat production. And many data centres are operating at 20-30kW per rack.

Even in an equipment static environment, virtualized servers can change the ir heat profile dramatically within a few minutes as they ramp up from an idle state to fully operational mode. The impact is twofold. Increased air intake requirements from the servers and increased temperature exhaust air. If sufficient inlet air is not available servers can overheat and malfunction. The higher temperature exhaust air, which if not managed properly will recirculate causing the inlet air temperature of the nearby racks to potentially increase to unacceptable levels.

Computer room air conditioners (CRAC) are also a culprit in the data centre. These units respond to the return air temperature of the room. This has two effects. First, the supply air temperature for the servers is likely much cooler than it needs to be. Secondly, with most data centres having levels of air bypass in the 50-70%, the return air temperature is cool and the CRAC units are not responding to the need of the high end equipment. In addition, virtually all CRAC fans run at full speed, 24 hours a day, whether it is required or not. With the dynamically changing heat patterns of virtualized servers this means a substantial waste of energy and cost during the off-peak periods.

Getting cooled air to the right places when required and returning hot exhaust air efficiently to the CRAC unit is what is required.

So how can this be achieved?

The key to knowing what goes on behind those doors of the data centre is to implement a comprehensive monitoring system. The traditional couple of temperature sensors on the wall or ceiling along with an alarm system is no longer adequate.

Properly monitoring a data centre involves taking air inlet and exhaust temperatures readings at the rack level along with humidity indicators. As well power consumption of all the key equipment, CRAC's, PDU's and UPS. A good monitoring system consolidates and provide this information to the data centre operator in a comprehensive graphical layout with updated readings every few minutes. Included in this view should be the ability to do historical searches to determine changes in temperature patterns or power consumption.

A thermographic view of the data centre (Figure 1) provides the operator with a clear indication of the temperature ranges within the data centre at the rack and aisle level. Based on this they can make informed decisions for the placement of additional equipment or fine tuning of the perforated tile placement. As changes are made to the data centre to improve efficiency the impact of these changs can be clearly seen.

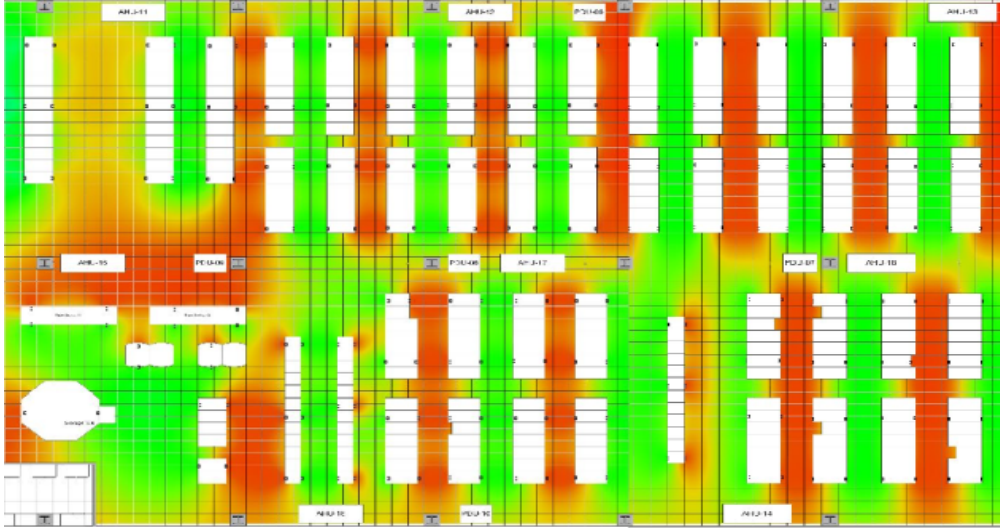


Figure 1

Using the information from the monitoring system the operator can adjust the temperature of the data centre to conserve energy while knowing what the impact is on the operation.

In a larger data centre the next step is to use the monitoring system to efficiently manage the air supply. This is achieved by communicating with the CRAC control system. No longer are the CRAC units operating on the basis of the return air temperature. Tying the monitoring system to the CRAC units allows this system to manage the CRAC operation based on supply air requirements of the IT equipment. By upgrading the CRAC units with Variable Speed Drives (VSD) the energy and operational efficiency of the data centre can be substantially increased. The addition of VSD's allow the monitoring system to control the fan speed as well as the temperature. And in a larger data centre with multiple CRAC units, zones of influence can be established. These zones may be comparable in cooling requirements or significantly different. If they are different the monitoring and control system takes this into account, adjusting the air volume and temperature to meet the specific needs of the zone.

Energy to drive CRAC fans is one of the major power consumers in the data centre. By reducing fan speed by 20%, energy savings are in the range of 50%. In actual fact it is more economical to have multiple CRAC units running at a lower speed range than it is to shut off a CRAC and continue to run the others at full speed. The lower speed also extends the life of the CRAC units.

An effective monitoring system will provide the operator with detailed information to aid in the move toward a more energy efficient operation while improving the operational environment. It will help in extending the life of the data centre and will be a powerful tool in the growth decisions of the centre. In addition, for organizations with

multiple data centres, whether across the street, country or world, a monitoring system will enable the operator to monitor all centres and control their operation. By implementing a monitoring system now you will immediately begin to save money and ensure your critical operations centre is being properly managed.

For more information on data centre monitoring and how it can improve your data centre visit our website at www.sct-inc.com or give us a call (613-558-4415).

SCTi focuses on data centre energy and operational efficiency with the objective of helping data centre operators save money while improving their data centre. By taking a holistic view of the data centre SCTi can help you save money, extend the life expectancy of the data centre and the infrastructure.