

Liebert Data Center Audit



Audit Completed For:

Jim Jones
Sunshine Corporation
200 Sunnyvale Drive
Orlando, FL
888-555-8888

Audit Completed On:

July 1, 2009

Audit Completed By:

Dave Smith
Liebert Corporation

EXECUTIVE SUMMARY

Your overall data center score is “**Good**” meaning that your data center operations are in conformance with a moderate percentage of best practices. However, improvement is recommended in several areas and is recommended that you engage your data center partners to ensure you are comfortable with your data center’s availability, efficiency, and overall operating characteristics. Based on our analysis of your site, some specific areas of opportunity are indicated below. See the *Best Practice Analysis* section of the report for additional details.

Data center **availability** is at high risk due to not being in compliance with the following best practice(s):

- 1.2 Server Inlet Temps
- 1.3 Server Inlet Dew Point Temp
- 1.4 Cooling Capacity
- 1.6 Cooling Redundancy
- 2.10 UPS Capacity
- 3.1 Site Level Monitoring
- 3.5 Data Center Equipment Monitoring – Battery

Data center **efficiency** can be improved by implementing the following best practice(s):

- 1.8 Variable Capacity
- 1.9 Economizers
- 1.12 Blanking Panels
- 1.14 Rack Door Perforation
- 1.15 Air Isolation
- 1.18 Raised Floor Perforated Tile Location
- 2.11 UPS Unit Age

High return can be achieved by implementing the following best practice(s) where the risk rating is greater than cost or difficulty of implementation ratings:

- 1.2 Server Inlet Temps
- 1.3 Server Inlet Dew Point Temp
- 1.6 Cooling Redundancy
- 1.12 Blanking Panels
- 1.18 Raised Floor Perforated Tile Location
- 2.2 Transient Voltage Surge Suppression (TVSS)
- 3.3 Data Center Equipment Monitoring - ATS/Generator
- 3.5 Data Center Equipment Monitoring – Battery
- 3.7 Data Center Equipment Monitoring – Cooling

The sales consultant who conducted your Liebert Data Center Audit had the following observations and recommendations based on their review of your site:

The Sunshine Corporation data center is approaching capacity in terms of floor space, cooling and UPS. However, the average rack density in the room is only 3kW per rack and racks on average are only about 50% loaded. Since Sunshine Corporations growth plans will put added pressure on the already strained data center, it is recommended that the following actions be taken:

- Setting up a high density zone will allow for the addition of IT equipment to existing racks and possibly the decommissioning of some racks to open up floorspace if decommissioning or moving equipment is possible. In your sized data center, the most effective way to do this would be the implementation of a cold aisle containment zone, which will enable densities of 10kW per rack.
- The addition of 15 ton Liebert DS unit is recommended for N+1 redundancy to improve the availability of your site.
- Some areas in the data center have excessive heat and humidity. Implementing additional cooling units will help, but in the short term, cooling setpoints should be adjusted and blanking panels implemented in all open U space to improve cooling effectiveness.
- Perforated floor tiles should be removed from the hot aisle.
- Also, you may want to start thinking about budget dollars to upgrade your old Series 300 UPS with a new Liebert NX
- A site level monitoring system, like Liebert Nform, and a battery monitoring system, like Alber, will also help to maintain availability in your Tier 2 data center.

If you have any questions or would like to learn more about how to improve the level of protection in your facility, please contact the following:

IT Reseller:

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407-555-8700
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Liebert Sales Consultant:

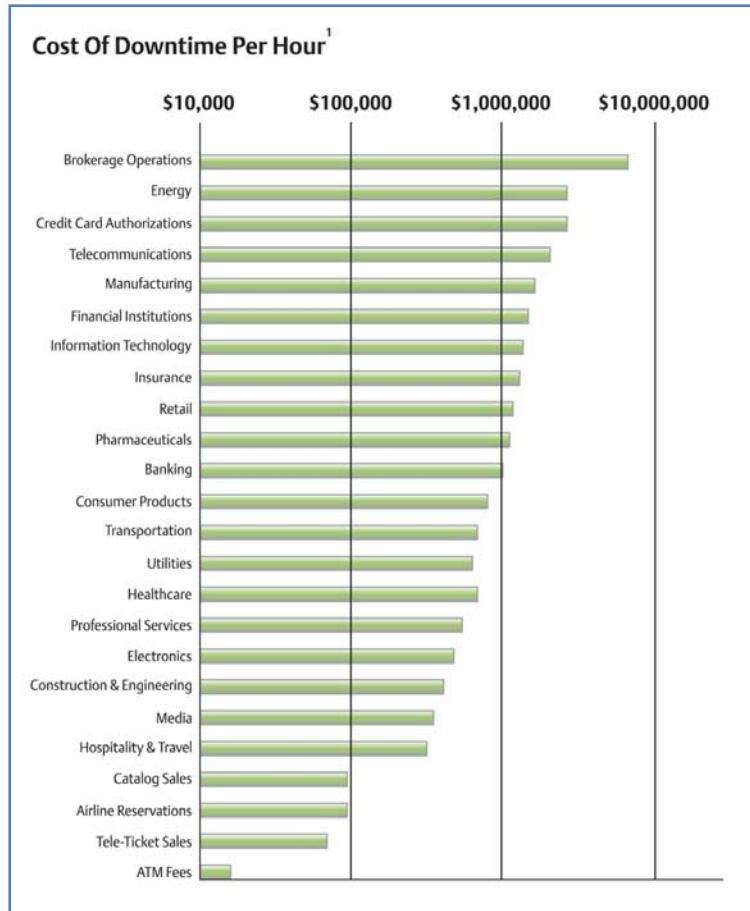
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DATA CENTER TRENDS

Today's data centers are under increasing pressure to do more with less. Reliance on information technology continues to grow, while budgets and IT staff shrink. As capacity demands and data center changes intensify, it's increasingly difficult to ensure that the proper infrastructure support is in place to achieve business goals, whether they be IT expansion, blade server installation, IP telephony implementation, consolidation or virtualization.

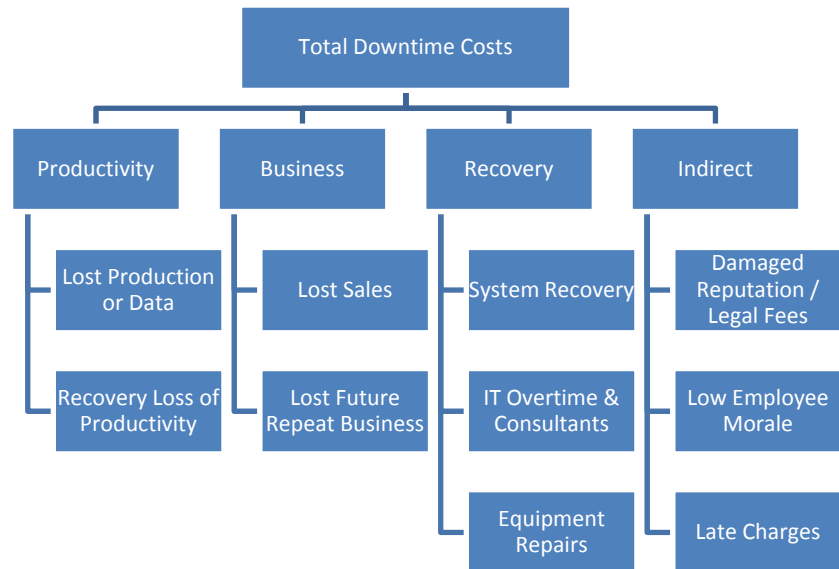
Data Center outages can be detrimental to businesses - according to a recent IDC report, 50 percent of businesses never recover after an outage and 90 percent go out of business within two years. When you look at the average cost of downtime per hour in various industries (to the right), this is not too surprising.

Many businesses do not understand the need for a solid data center infrastructure until they have experienced an outage. Lack of awareness and understanding is highest with small businesses. According to an Emerson Network Power survey, only 39 percent of small businesses have backup power systems. Contrast that with the knowledge that 79 percent of businesses had at least one power failure during 2007 and 29 percent (one in four) had three or more outages. Forty-two percent of those companies didn't have an adequate backup power infrastructure and had to close their business as the result of an outage.



¹Source: Meta Group

The total cost of downtime resulting from an outage can come from surprising places. Total downtime costs are derived from employee productivity, business losses (both current and future sales), recovery costs and indirect costs, such as missing ship dates or frustrated customers from not being able to access information off a downed website. Lost future repeat business is an especially tricky metric to measure, but can have a large impact. Some estimate that it can cost up to 10 times more to get a new customer than to retain a current one.



In addition to downtime, a variety of other data center pressures are weighing on the minds of today's data center, IT and facilities managers. Heat density continues to top the list of concerns along with power densities and maintaining availability. Energy efficiency is a growing concern and area of focus for businesses of all sizes as potential government regulation and increasing energy costs are brought into the media spotlight.

	0%	20%	40%	60%
Heat Density				56%
Power Density				50%
Availability				45%
Adequate Monitoring				43%
Energy Efficiency				40%
Space Constraints			26%	
Data Center Consolidations		13%		

Data Center Users' Group Top Data Center Challenges

While the level of criticality of your business will have an impact on the level of availability you will require of your infrastructure support (describes as Tiers), Emerson Network Power's Data Center Audit is designed to give you a snapshot into the health of your data center and lay the foundation of knowledge you'll need to jumpstart improvement initiatives.

DATA CENTER OVERVIEW

Emerson Network Power conducted a Liebert Data Center Audit at Sunshine Corporation's data center located at 200 Sunnyvale Drive in Orlando, FL. This audit was completed by Dave Smith of Liebert Corporation on July 1, 2009.

Audit Statistics

Based on our evaluation of your data center relative to industry best practices, your level of protection was found to be "**Good**". This analysis was completed based on visual inspection and discussion with those responsible for your data center operations. Some assumptions may have had to be drawn.

A stoplight color system was used for this evaluation:

✔ **Green - The data center is in compliance with best practice**

⚠ **Yellow - The data center falls short of best practice**

✘ **Red - The data center is at risk due to not being in compliance with best practice**

Here is a graphical representation of how well your data center performs relative to industry best practices:

Data Center Performance Relative to Industry Best Practices



Data Center Statistics

Provided below is a summary of key data center statistics as of July 1, 2009, the date your data center audit was conducted.

Room Statistics

Total Square Feet: 1050

Approximate Floor Space Utilization: 79%

Data Center Expansion Completed (last 12 months): No

Data Center Expansion Planned (next 12 months): Yes

Expected Growth Percentage (next 12 months): 10%

Rack Statistics

Number of Racks: 25
Approximate Rack U Utilization: 50%
Average kW per Rack: 3
Max kW in Any Rack: 5
Total Approximate Load: 75kW

Cooling Statistics

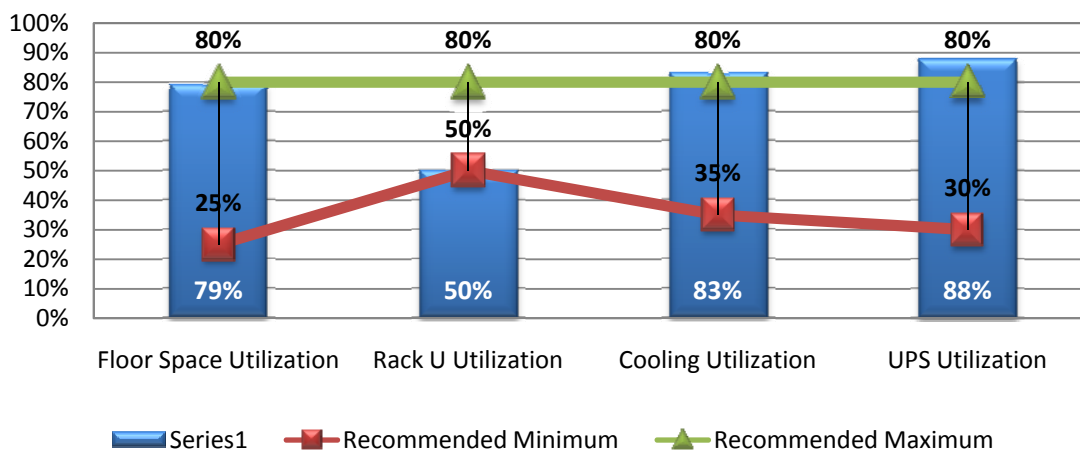
Number of Cooling Units: 3
Total Cooling Capacity: 90kW
Non-redundant Cooling Capacity: 90kW
Approximate Utilized Cooling Capacity: 83%

Power Statistics

Number of UPS Units: 3
Total UPS Capacity: 120kW
Non-redundant UPS Capacity: 80kW
Approximate Utilized UPS Capacity: 88%

To operate efficiently while allowing for growth, it is recommended that your utilization fall between a certain recommended range as indicated by the chart below. Your actual utilization is denoted in the blue bars.

Data Center Utilization



BEST PRACTICE ANALYSIS

Emerson Network Power has audited your site relative to data center best practices. Best practices are broken into five categories: Cooling, Power, Monitoring, Service and General Facility and Security. Each best practice addresses six parameters:

- *Status* – This is a description of the current state of your data center
- *Risk* – This is the availability risk level of your data center based on your current status
- *Description* – This provides detail on the best practice and why it should be achieved
- *Resolution* – what should be implemented to be in compliance with best practice
- *Cost Implication* – This is an estimate of the average cost to implement best practice from your current state
- *Difficulty of Implementation* – This is an estimate of the average difficulty of implementing the best practice from your current state

Risk, Cost Implication and Difficulty of Implementation are averages based on a five point scale:



Please note that your actual cost or difficulty may vary from these averages and should be evaluated in further detail based on your unique site parameters before making final implementation decisions.

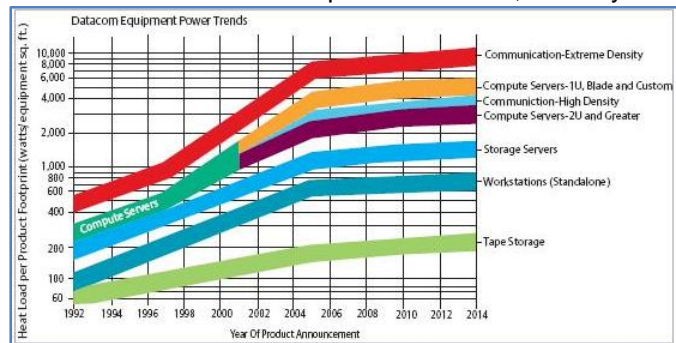
Cooling Best Practice Analysis

1.1 Precision Cooling

✔ **Status:** Precision cooling is utilized

Risk Level: N/A

Precision cooling offers a much higher level of reliability compared to comfort cooling systems. Precision systems use rugged refrigeration components that are designed to operate 24 hours a day, 365 days a year. They also provide air filtration and the precise temperature and humidity control required by sensitive IT equipment. Non-precision split systems can offer 24x7x365 temperature control, but they do not control humidity which, when too high or too low, can have a detrimental impact on sensitive electronics. As IT equipment becomes more dense, it becomes more and more critical to use precision cooling to maintain desired temperature and humidity levels. And although precision cooling systems have a higher initial cost, the life-cycle cost is often lower than comfort cooling (building systems) due to higher sensible heat removal for the same sized system.



Heat Densities are Rising

Resolution: N/A - Your data center is in conformance with best practice

Cost Implication: N/A

Difficulty of Implementation: N/A

PLUS an evaluation of 14+ additional cooling best practices

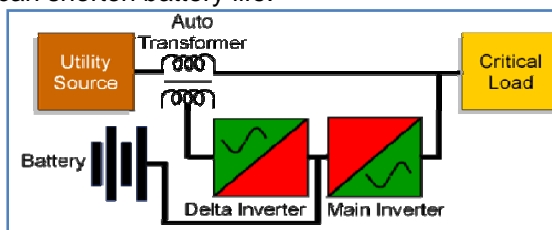
Power Best Practice Analysis

2.8 UPS Topology

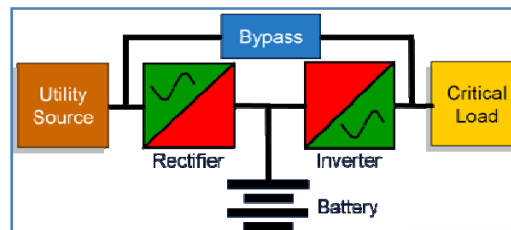
✔ **Status:** Double conversion, online, UPSs are used

Risk Level: N/A

Since offline UPSs are not recommended for supporting sensitive electronics, two topologies of UPSs are commonly found in data centers: double conversion, online, UPSs and delta conversion, line-interactive, UPSs. While line-Interactive UPSs provide effective protection during outages, they can leave IT equipment susceptible to power anomalies during normal operation. An online double-conversion UPS completely isolates output power from input power anomalies and delivers 100% conditioned, perfect sine-wave, power. Additionally, voltage and frequency regulation, isolation transformers and zero switching time improve fault tolerance. Double-conversion, online, UPSs are the only UPS topology recommended for use with generator backup systems. Though Online UPSs are typically more expensive up front, they provide higher availability and can offer better TCO due to less wear and tear that can shorten battery life.



Delta Conversion, Line-Interactive, UPS



Double Conversion, Online, UPS

Resolution: N/A - Your data center is in conformance with best practice

Cost Implication: N/A

Difficulty of Implementation: N/A

PLUS an evaluation of 16 additional power best practices

Monitoring Best Practice Analysis

3.5 Data Center Equipment Monitoring – Battery

✘ Status: No battery monitoring software is used

Risk Level: 5

More than a third of UPS system failures are related to the batteries. Premature battery failure can result from:

- High or Low charge voltage
- High or Low temperature
- Excessive discharges
- Excessive charge current
- Over Torque battery terminals
- Unknown factors (i.e. manufacturing defects)

Battery monitoring is an effective way to avoid downtime from catastrophic failures that could cause harm to people and equipment. An added benefit is the ability to improve Service Level Agreements by minimizing maintenance time. Battery monitoring provides information about all parameters that affect battery life, including internal resistance, temperature, voltage and float current, allowing for corrective actions to maximize useful life.



Battery Monitoring Identifies Bad Cell

Resolution: Implement battery monitoring

Cost Implication: 4

Difficulty of Implementation: 3

PLUS an evaluation of 17 additional best practices in the areas of Monitoring, Service and General Facility & Security, for a total of 50+ data center best practices that will be analyzed and reported on.

The report also includes three appendices: “Data Center Summary”, “Cooling Interdependencies” and “Room Layout” (if provided)