Making The Right Choice In UPS Batteries

Cost, Reliability & Footprint Drive Purchasing Decisions

Server virtualization, quad-core processors, direct-attach cooling equipment, and flavor-of-the-month products can often grab the attention of IT decision makers as they plan data center expansions or new facilities. Those executives know, however, that decisions made about the batteries they use to power their critical uninterruptible power systems could spell the difference between business success and failure.

"IT managers don't get fired because the electricity bill is too high," says Martin Reynolds, an analyst for Gartner. "They get fired because they can't deliver to the computing requirements of the organization." An enterprise ground to a halt by a power outage won't engender too much board room confidence.

"Batteries generally need to be pretty high on the radar," says Jeff Donato, service product manger for Emerson Network Power , where he helps businesses design, populate, run, and maintain their data centers. According to a survey by Emerson Network Power, batteries are the leading cause of system failure. Battery-related failure accounts for 37% of all UPS system failures, according to the survey.

UPS and battery failure can be caused by a number of factors, including general wear and tear associated with electromechanical devices, but failure can also often be directly tied to core maintenance programs that can be addressed with an in-house or third-party battery monitoring platform.

"There are a lot of companies that, quite frankly, will scale back on maintenance programs at times for various reasons," Donato says. "So battery monitoring seems to be taking off right now to help customers predict failure and work proactively to evade load loss."

A Few Considerations

Enterprise customers always have three basic considerations when making data center battery decisions, says Stephen Vechy, marketing director for UPS at EnerSys (www.enersysinc.com) , a $1.2 billion supplier of batteries in 2006.

"It is always reliability, footprint, and economics," Vechy says. "Those are the underlying questions in every customer's mind when they are attempting to develop a strategy that meets and balances all those requirements. You always want the highest reliability in the smallest space for the most economical cost."

Like any part of a data center project, UPS and related battery requirements should be evaluated to ensure the implementation will best meet specific requirements while providing the optimum trade-off in lifetime and performance value, Donato says.

“The design and type of battery type must be considered when determining the power load to be delivered to any data center,” Donato says. “It’s an equation solved by a combination answer that is determined by the load I’m trying to support and the specific operating environment.”

There are some overriding considerations all IT directors and data center managers should consider when making new battery purchases.

Flooded vs. valve-regulated. Large data center operations with adequate adjacent real estate often use flooded batteries, a style of battery where gases created are vented from the top of the cell. The flooded, or VLA (vented lead acid), batteries provide a total life time of up to 20 years and are highly robust and reliable.

The VLA batteries are also large, expensive, and generally must be supported offsite from the raised floor of a data center. That can be a plus or minus, depending on the cost and availability of data center space. An average VLA battery string is between $70,000 and $100,000 with installation.

VRLA (valve-regulated lead acid) batteries also generate gases, but they are contained within a sealed environment. The batteries can be placed in cabinets within the raised floor of data centers and within close proximity to the equipment they support.

VLRA batteries offer a relatively cheap and easy way to quickly expand a data center or add redundancy. Life expectancy of the batteries, however, is typically between five to six years. An average VLRA battery string is priced between $7,000 and $8,000.

The optimum string length. Determine what battery string length best meets your reliability requirement. Having a single string of batteries in a battery center, while potentially expedient in some respects, could prove to be a bad choice if there is a cell failure somewhere along the string.

Even when installing multiple strings, IT and facilities directors need to consider the run time design and the trade between price and reliability. Two 30-minute strings will be more expensive to purchase than a single one-hour string, but the shorter strings will provide better protection.

Take a closer look at the up-front purchase costs (or bury them). That big difference in purchase price and design life of VLA and VRLA batteries can also provide different possibilities for budgeting the purchase. The higher upfront cost of VLA batteries tends to lock the purchase into a businesses’ capital budget. With the cost of a string less than $10,000, VRLA purchases can often be shifted into a maintenance budget. Data center managers can develop plans that meet their own budgeting path concerns.

Don’t forget the maintenance. If over-charged, gas generated within VRLA batteries can lead to safety vent releases that will “dry-out” the cell, resulting in a permanent loss of

capacity. A 10% water loss in a cell can equate to a 25% loss in capacity. This environmental factor should also be considered when determining the physical location of the batteries.

Data center or facilities managers also need to keep an eye on normal aging by using a systematic maintenance program that includes inspection for grid corrosion and separation of the paste and grid. Excess discharges and the room temperature can also affect the lifetime of batteries.

Integrate remote monitoring solutions into the plan. Having an up-to-date understanding of the condition of your batteries can allow a data center manager to optimize the lifetime of the equipment and remain confident that power will be available when needed. With proper analysis, the accumulated data will improve your ability to make informed maintenance and replacement decisions.

Watch the mixing of old and new VRLA batteries and keep those spares onsite. Try to avoid any cell mismatches and maintain uniform measurement of installed batteries relative to their ages. It can take only one bad cell to bring down a UPS.

The cost and portability of VRLA batteries can allow for the installation of onsite spare battery racks that can remain charged and ready for action. The spares age with the original battery string, which reduces the risk of a battery mismatch.

A rolling cabinet of spare batteries can also reduce the number of physical visits needed to repair a damaged battery string.

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