WHITE PAPER

canara

Battery Aging Analysis

Improve your ROI by moving to a condition-based replacement strategy

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INTRODUCTION

With increasing data center demands, there is a growing need to better understand how to manage the added volume and complexity. As such, facility managers are facing mounting pressure to manage their facilities more efficiently and cost effectively while still maintaining 100% uptime. They are deploying virtualized servers, consolidating facilities and managing capacity with actual demand. Yet, many still replace strings of batteries, at an average cost of $12,000.00 each, every 3-4 years without a second thought - despite energy being the fastest growing cost component of data center OpEx.

Collecting Data from a Battery Monitoring System is the First Step

Without access to comprehensive battery data over the life cycle of the asset, it is very difficult to determine when to replace an individual battery and more importantly, when to replace an entire battery string. Since this data is not readily available from quarterly battery maintenance inspections, a standard industry practice has been to perform time-based replacements versus needs-based replacements. The net result of this approach is that many battery strings are replaced prematurely and capital costs are not fully optimized through amortization over the “true” useful life of the string.

However, today’s approach to battery management for many operators involves applying Internet of Things (IoT) sensors to the batteries that collect initial load test results, ohmic values, temperature history, and voltage. This sensor data is typically used to alert an operator when there is an issue. But by looking at performance metrics over a large span of time, the data can reveal insights into how different variables can impact the performance and lifespan of an asset and provide indications of remaining “true” useful life.

Big Data Analytics Platform Produces Battery Signatures

For over 20 years, Canara has been collecting, trending and comparing battery data from critical systems all around the world, and has built the world's largest historical database. By combining the life cycles of batteries of the same type, make, and even the manufacturer date batch, we have developed proprietary algorithms for calculating and forecasting remaining service life. Our algorithms include characteristics of temperature history, average ohmic measurement/trend, number of discharges, depth of discharges, battery model/make, UPS load %, and several other factors.

These algorithms provide us with the insight necessary to best predict remaining useful life of battery systems, as many parameters can have a harmful effect on your battery health. Unlike the traditional approach to battery asset management and replacement, Canara's expert engineers have historical data to help identify and interpret trends in current operations to provide insight into remaining useful life. As seen in Figure 1, our predictive model also accounts for factors that might have shortened or extended life cycles to establish reference battery life cycle signature.

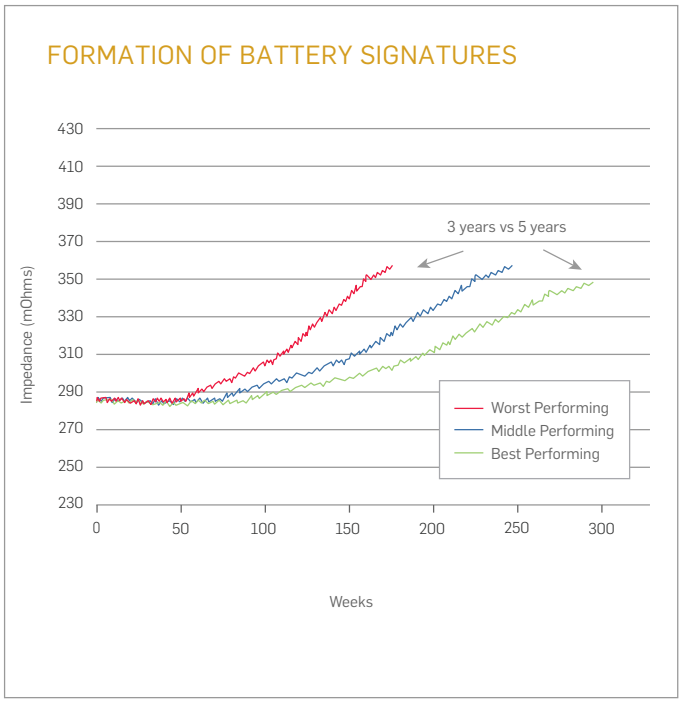

Figure 1: Formation of Battery Signatures

Mapping Actual Performance Data to Signatures

Through our historical data and proprietary algorithms, we can identify a signature that reveals an aging dynamic or battery life cycle and gives us a set of parameters to use to project remaining useful life for our customers' batteries.

The modeled signature, in Figure 2, illustrates comparison of actual battery metrics to a standardized aging dynamic or battery life cycle. In this case, actual performance maps very closely to the reference value. Regardless of correlation to the most typical benchmark values, inputting the individual battery data into the predictive model can forecast end of useful life for the battery asset. By mapping the specific battery system data onto the context of the battery life cycle, a health map for problem identification is created, allowing for more informed decision-making and more efficient operations management.

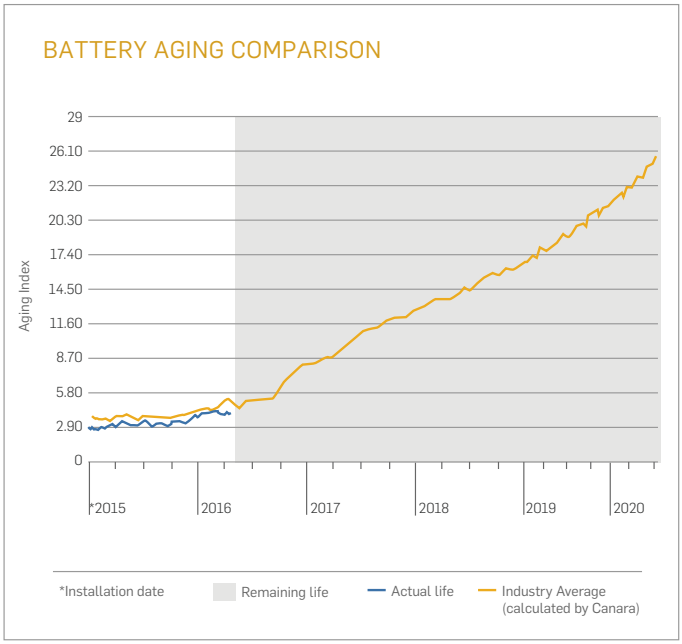

Figure 2: Battery Aging Comparison

Bringing Accuracy to Budget Forecasting for Battery Replacements

Combining the data from a stationary Battery Monitoring System (BMS) with Canara's predictive analytics platform allows Canara to predict the expected remaining service life of each individual string in your infrastructure. This critical asset management function offered by Canara takes the guesswork out of the equation as strings are replaced based upon performance and condition and not based upon time since installation.

Leveraging historical data and reporting, customers can readily see how battery strings are aging over time, view the performance index ratings of each system, and understand projected replacement requirements to prioritize battery replacement across installed systems, eliminate load-loss risk and avoid budget surprises.

UPS	Battery Count	Location	Date Code	Actual Replacement Age (Years)	Benefits vs. standard 4-year replacement interval
1	120	NY	11/1/2006	2.2	Avoided risk to connected load
2	120	NY	3/1/2007	1.8	Avoided risk to connected load
3	120	NY	9/1/2005	4.3	Extended life by 4 months
4	120	NY	9/5/2005	4.3	Extended life by 4 months
5	120	TX	11/15/2003	6.2	Extended life by over 2 years
6	120	TX	10/15/2003	6.3	Extended life by over 2 years
7	120	TX	10/15/2003	6.2	Extended life by over 2 years
8	120	TX	11/15/2003	6.2	Extended life by over 2 years
9	120	TX	11/15/2003	6.2	Extended life by over 2 years
10	120	TX	11/1/2004	5.2	Extended life by over 1 year

Table 1: Benefits of Battery Replacement on Condition Versus Time

Condition-based Replacement Improves ROI

Eventually all batteries need to be replaced. With condition-based replacement, you can defer costs and use your asset throughout its actual useful life. Capital investment is optimized and batteries are replaced on an as needed basis versus a time-based (e.g. every 3-4 years) model. On average, we have found battery life can be extended by 6-24 months when predictive analytics and monitoring are deployed.

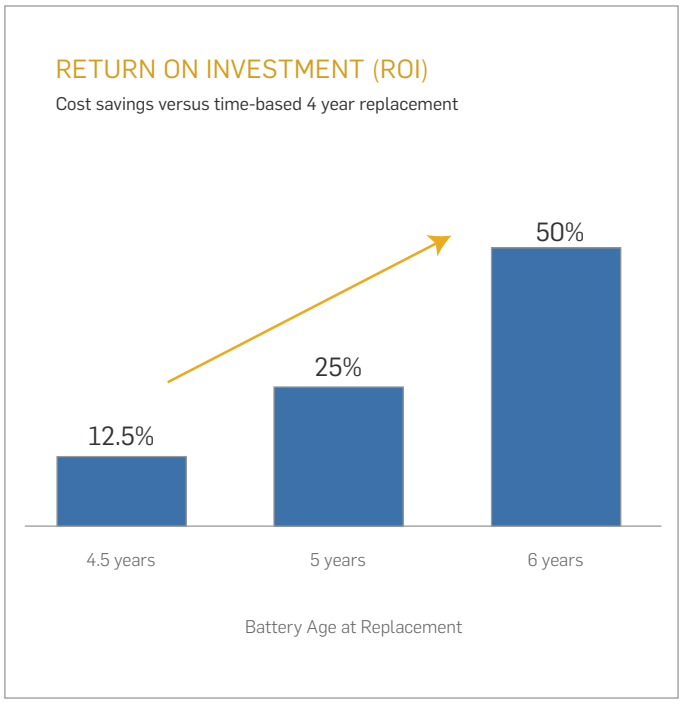

Figure 3: ROI: Savings on Battery Investment

With this level of detail, our predictive analytics can also be used to better manage risk of failure and expedite any warranty claim processes. In order to successfully claim a warranty replacement, manufacturers' require batteries to be operated and be maintained within specifications. Since Canara maintains the entire data history for these systems, we are able to certify the battery history against the manufacturer's specifications and provide evidence of environmental conditions and battery asset management.

CONCLUSION

With demands for uptime and efficiency on the rise, data center managers cannot afford to risk outages, and CFOs cannot afford to unnecessarily replace expensive equipment. With Canara's 20+ years of data, our experts can predict the lifecycle of your batteries – empowering facility managers to be more efficient, meet demands, and improve the bottom line. Contact us today to request an aging analysis report of your battery systems or for more information on Canara, visit www.canara.com.

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