Field Trial

Surge Protection System for lighting protection at a Major Retail Company's Facilities

Test conducted by:
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Background Information

Lighting can account for up to 40% of a building's energy bill. In efforts to reduce power consumption expenses, many retail and commercial building managers replaced their existing lighting with energy efficient electronic lighting ballasts and fluorescent lamps to help reduce this expense. Energy efficient ballasts require less energy to start and keep the lights on. Some ballasts can be connected to motion sensors in the room to detect when someone has entered the room. When skylights and light level sensors are used in conjunction with dimmable ballasts and a building management system, the lighting load can be adjusted based upon ambient lighting levels reducing the lighting systems' energy consumption. A technology that used to be as basic as a light bulb and a switch has now become extremely complex. Existing lighting ballasts require sophisticated printed circuit boards with microprocessors imbedded in the circuitry to control the logic that enables the ballasts to save energy, ultimately saving the end-user money. However this new sophisticated technology is still being powered by the same power infrastructure. A technology that was once robust is now extremely susceptible to transient surge events.

Many companies have made the transition to energy efficient electronic lighting and are benefitting from lower electric bills. The trade-off of installing energy efficient lighting technologies is the increased maintenance costs due to premature equipment failure.

Thomas & Betts contacted one of these companies to see if we could help determine a root cause for the increased lighting maintenance costs and to investigate potential solutions. The company agreed to let us assistant them and provided ten stores for the evaluation. Several of the locations selected were stores that had seen the largest increase in lighting maintenance costs since switching to energy efficient electronic lighting ballasts and lamps.

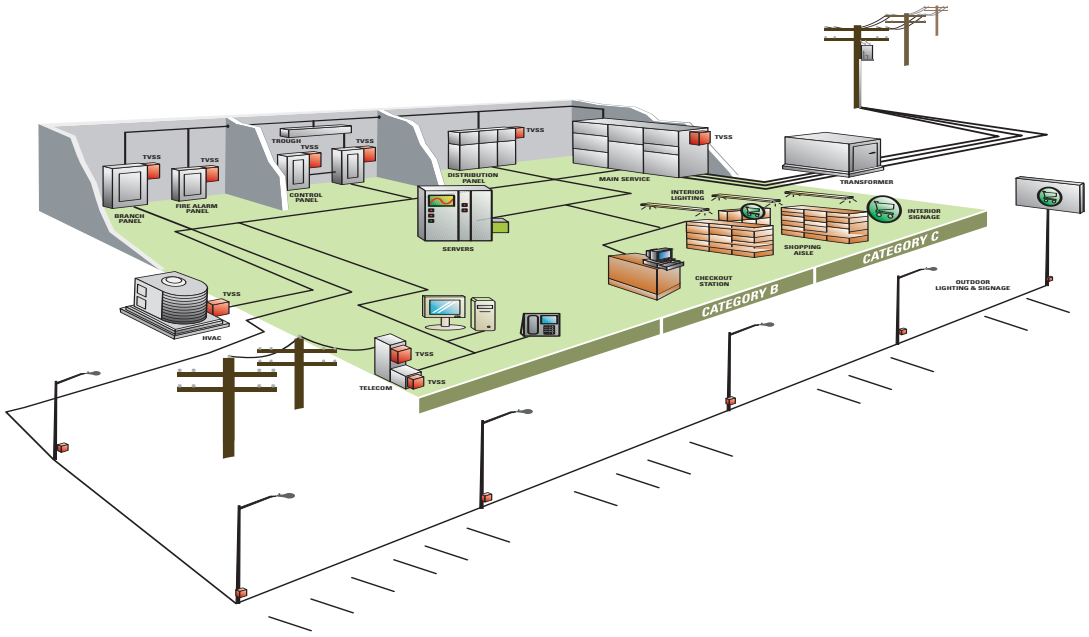
Site surveys and utility grounding audits were conducted at each location with no major findings to report. A review of the company's maintenance expenditure report suggested that two factors contributed to the increase in the lighting maintenance budget.

1. Stores that were using the new energy efficient electronic lighting ballasts.
2. Significant lighting failures inside and outside the store, with a higher concentration of failures in the Central and Southern states; particularly stores with parking lot lighting controls and environmental controls in the stores.

The data suggested that the lighting ballasts and lamps have been susceptible to transient surges. To validate this information several common and popular style energy efficient electronic ballasts and lamps were purchased and brought into Thomas & Betts UL certified test lab. Each ballast was subjected to several different surge wave shapes as defined by IEEE C62.34. The test results revealed that all of the ballasts tested failed when subjected to a single Category C3 surge event. The same tests were repeated using the same make and model of ballast and lamps but this time a surge protection device

was installed in front of the lighting ballasts. The results showed 100% functionality of the lighting ballasts and lamps after repetitive C3 surges.

The tests performed in the lab demonstrated that properly installed high performance surge protection will help limit the failure of lighting ballasts and lamps to transient surge activity. It appeared that both the problem and a suitable solution had been identified. The next step was to apply the proposed solution in the field. All ten stores had small surge protection devices installed at each parking lot light pole and more robust surge protectors installed on the lighting and control panels inside. The diagram below shows a typical store layout and where surge protectors were installed.



Summary of Results

Once the surge protection was installed in each test store, maintenance costs were compiled over a 12-month period. Each test store realized a significant decrease in lighting maintenance costs due to the surge protection installed. The chart below shows the lighting maintenance figures provided by the company for five store locations. The figures show lighting maintenance costs before and after surge protection was installed.

	Monthly Expense Before Surge was Installed	Monthly Expense After Surge was Installed	% Decrease in Lighting Maintenance Dollars
Store #1	$1,800.00	$95.00	>70.0%
Store #2	$1,100.00	$107.00	>70.0%
Store #3	$1,950.00	$155.00	>70.0%
Store #4	$2,800.00	$120.00	>70.0%
Store #5	$2,166.00	$87.00	>70.0%

Conservatively, the longest return on investment (ROI) in the stores evaluated during this test was less than one year.

Recent follow-up calls with the individual stores involved in the test has shown a continued decline in lighting maintenance costs due to a decrease in ballast and lamp replacements. This field data was collected over a period of about 4 years (2005-2008).

Conclusion

As a result of this study, these locations are realizing true cost savings on a long-term continuous basis. All maintenance and repair associated with the electronic ballasts and lamps appear to be permanently reduced by at least 70% or more based on the field trial results. There would also be expected long-term reductions in power consumption due to the energy-efficient electronic lighting ballasts and the increased performance and efficiency of the ballast and lamps as a result of the installation of the high performance surge protection devices at the referenced power panels and parking light poles.

The increase in performance and reliability of the electronic lighting ballast and lamps and its related value was not evaluated as part of this field trial study. Therefore it is not factored into the ROI. However, it is clear there is an expected increase in performance and reliability of the lighting system with the installation of high performance surge protection devices (SPD's). With the positive results relating to protecting the lighting system in these retail facilities, common sense dictates that there would be significant additional cost-justified savings (ROI) expected if a complete power protection system was installed isolating all the electronic and electrical equipment in the facilities. The resulting savings would include, but not be limited to, reduced maintenance/repair, increased performance and reliability, extended equipment life and reduced risk of catastrophic loss for all the electrical and electronic loads in the entire facility.