

Princeton Kentucky Uses Cutting Edge Exacter Technology to Get Ahead of Issues and Take Its Electric Reliability to the Next Level



Summary

- Exacter found 17 at risk locations over 100 miles
- One substation problem could have taken out half the city
- Exacter uncovered long standing transmission line noise
- Total of 55 arcing issues were located and eliminated
- Princeton Maintains 99.9994% ASAI

The City of Princeton, Kentucky is located 100 miles northwest of Nashville Tennessee and 170 miles southwest of Louisville. Princeton is a hard working community with beautiful landscapes and a rich civil war history.

One of the true shining stars of the community is its municipal electric company who boasts an Average Service Availability Index (ASAI) of 99.9994%, making it one of the most reliable power providers in the State of Kentucky. Behind its superior reliability is the utility's commitment to serve its community and a healthy competitive spirit to be best at what it does. "Our electric reliability ratings are better than all of the larger utilities in the region. It is a big asset for Princeton in our efforts to attract companies to the area," states Chris Burton, Operations Superintendent & Safety Director for Princeton Electric.

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"For manufacturers making critical components, an outage -- even sustained flickering, can impact the process and cost the company lots of money in damaged parts, molds, or wasted materials. This is why we have to stay ahead of the game. Our approach is very proactive. When we see even a hint of an issue, we are investigating it and dealing with it before the problem occurs."

Princeton's Electric Company has a proactive and innovative management philosophy that endeavors to utilize the best, most cost-efficient means to maintain excellent reliability. "As part of our effort to provide excellent electric service, we are always keeping our eyes open for new technologies, or best practices that can improve our system," states Kevin

Kizsee, General Manager and Utility Engineer for Princeton. "We had heard some good things about a technology called Exacter from colleagues at nearby utilities. Exacter has been used by leading utilities around the country to find early stage problems on overhead lines. They locate deteriorating equipment showing no visible signs of problems, but eventually will cause an outage."

The most significant discovery from Exacter was an arcing current transformer (CT) inside one of the substations. Had it continued to deteriorate, it potentially could have caused an outage taking down half of the city

In the late summer-early fall of 2017, Princeton contracted with Exacter to do a comprehensive grid health assessment of its 100 miles of distribution overhead, 13 miles of transmission line, and its substation. "I was very interested in what the Exacter technology was going to find," continued Chris Burton. "Our reliability ratings were already great, but the idea of seeing new things and being able to get ahead of future problems is in line with how we manage our system."

Exacter found 17 at risk components that were arcing on the overhead distribution system. Most of the components were insulators or dead-end bells. The Princeton maintenance teams put them into their work order system and all of the locations were investigated and quickly repaired during regular work hours.

The most significant discovery from Exacter was an arcing current transformer (CT) inside one of the substations. Had it continued to deteriorate, it potentially could have caused an outage taking down half of the city and would have possibly resulted in costly damage to other components and systems inside the substation.

"The substation find was great, but also being able to repair the 17 issues during regular business hours instead of at night under emergency circumstances is much safer for our maintenance crew, and much less expensive for the community," states Burton.

Workmanship Issue - Almost all of the 36 arcing issues on the transmission lines were cushion clamps that had been torqued to the wrong specification. Once corrected, the arcing stopped.



Without question, the most interesting discovery of the Exacter health assessment was on the 13 miles of Transmission line. "We had been hearing noise on the lines periodically for a number of years. We thought it was corona, but despite multiple investigations there were no visible signs leading us to the problem," continued Burton. "Exacter found 38 places on our transmission system where arcing was occurring. This was very concerning because the cost to replace that many components and the potential of having to re-route power to the community during maintenance would be a major endeavor."

In the late fall of 2017 after the surveys were completed and the reports delivered, Princeton called on Exacter's Dane Nagel to come out with ultrasonic diagnostic equipment. They also had the manufacturer of the cushion clamp connectors to come out as they investigated some of the areas of concern. Using the Exacter report, Princeton crews in bucket trucks investigated the arcing components. "My fear was that the neoprene breakdown on the clamps was wearing down," continued Burton. "However, what we discovered was the cushion clamps had been torqued to improper specs. This was causing the arcing."

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Using hot sticks, Princeton maintenance crews retorqued the cushion clamps. Dane Nagel tested the problem point both before and after the rework using the ultrasonic dish and sure enough, after the repair, there was no arcing. That day, the teams went to four other sites to investigate the arcing insulators. In each case they retorqued the cushion clamps to the appropriate specifications and in each case the arcing ceased.

"That transmission line is only nine years old. There shouldn't have been any problems. It turned out that it was a simple workmanship issue of not torquing the cushion clamps to the right specifications. The key to eliminating the noise and arcing was Exacter's ability to pinpoint the specific component causing the problem," concluded Burton. "This allowed us to go to specific places to do the repair work. Overall, Exacter helped us get ahead of some issues and avert some potentially costly problems. Doing the health assessment has been a real benefit to our community."