

## Avoiding Splice Failures

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One of the primary root causes for splicing failures is poor cleaning of aluminum strands prior to compression. The Electric Power Research Institute has developed technology that enables line crews to properly prepare conductors quickly, efficiently and affordably. Improper cleaning of conductor strands can result in higher resistance terminations and splices that cause fittings to operate at higher temperatures leading to premature failure. To alleviate this concern, EPRI developers have come up with a system for cleaning the ends of overhead conductors prior to installing compression terminations and splices.

Prior to EPRI's conductor cleaning research, the predominant method to clean conductors before splice assembly was wire brushing. However, for complete and thorough cleaning, the conductor must be unstranded. This unstranding is an impractical requirement in most field conditions. Thus EPRI has initiated a multi-phase initiative to develop a method or tool for cleaning aluminum conductors.



The technology involves the agitation of a specialized solution to remove oxidation and grime from conductor strands, and can be adjusted for various cleaning cycle time, depending on the condition of the conductor. This methodology allows line crews to thoroughly clean conductors in much less time than traditional hand-cleaning methods. The technology was designed to be compact and portable to allow linemen to operate wherever the splice is most efficiently made – whether on the ground or up in a bucket.

Not long ago, Southern Company ran a beta test with the conductor cleaning tool. The Southern Company team put the tool to use during a restoration effort at Plant Bowen in Cartersville, GA, where three 500 kV feeders comprised of six structures were destroyed due to a tornado. The team completed 80 to 90 conductor cleanings over a two-week period. "With this new tool, Southern Company was able to do a single cleaning in about six minutes," according to Andrew Phillips, Director of Transmission Increased Power Flow at EPRI. "Using manufacturer conductor cleaning recommendations, which involves cleaning each strand, it would have taken 30–45 minutes to clean each one. A conservative, rough estimate of the time savings would be in the neighborhood of 1,920 minutes, or 32 hours saved."



For the first-time users at Southern Company, the tool proved to be a device you could learn quickly and put to work immediately with basic expert advisement. "The team saw the tool for the first time and adapted quickly to it," Phillips commented. "This was really a good situation to test the effectiveness of the device. They were experiencing an outage and in a worst case scenario they were prepared to spend 30 or more minutes to clean each conductor using the manufacturer's suggested cleaning method. If the first few did not go well, they would have gone back



to the recommended method and nothing substantial would have been lost. There was only an upside in choosing to use the device.” Alan Holloman from Southern Company shared this perspective, “The crew was amazed at how well and thoroughly the tool cleaned each conductor. It did a superb job. We would have missed an opportunity if we had not used it.”

There were a number of benefits from using the conductor cleaner. The device enabled crews to be timely and efficient in the splice making process and the splice that was made was more efficient than if they had used the traditional method. The cleaning process was also much faster, saving significant man-hours. Southern Company was also able to make its 500 kV lines available much earlier. Since the conductor is cleaned to the core, the finished product is also of better quality and this could help limit sleeve failures in the future.



A total of seven utilities were part of the project to develop the conductor cleaner. The group of utilities included American Transmission Company, Tennessee Valley Authority, Oncor Electric Delivery, Public Service Electric & Gas Company, CenterPoint Energy, East Kentucky Power Cooperative and Southern Company. Southern Company was the first to use it in scale. Heat-cycle testing of compression connectors by EPRI shows that connectors installed using this technology consistently outperform connectors installed using wire brushing as evidenced by lower operating temperatures and longer life.



**Before**

**After**

For additional information on proper splice methodology, or for information on other topics related to effectively managing electric utility assets, please contact [EDM International, Inc. 970-204-4001](https://www.edm-international.com).

