Conductor Cleaning Tool

Georgia Power transmission construction lineman making conductor sleeve.

Overview

The failure of compression connectors poses a significant risk to the reliability of the power transmission system. These failures follow trends caused by aging splices and conductors and are expected to increase in magnitude over time. Data suggests that a primary root cause for failures is improper installation. Examples of improper installations include lack of compound, alignment, wrong die and poor cleaning of the aluminum strands. A research project conducted by the Electric Power Research Institute has resulted in the development of a conductor cleaning tool that is a faster, more efficient, and inexpensive means to cleaning transmission conductors.

Solution and Results

Recently, Southern Company ran a beta test with the conductor cleaning tool developed by EPRI and built by EDM International, a contractor on the project. The Southern Company team put the tool to use during a restoration effort at Plant Bowen in Cartersville, GA, where three 500kV 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," stated 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 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."

Applying the Technology

The manufacturers suggested conductor cleaning process is labor intensive and time consuming. If the process is not carried out completely, it could eventually lead to the poor performance of compression fittings. Manufacturers suggested cleaning methods involve unstranding the wires in the conductor and then restranding them after the cleaning. The conductor cleaner, which uses a detergent-like solution, gives utilities the capability to thoroughly clean conductors without any extraordinary steps and accomplish the cleaning in a shorter amount of time.

"Utilities have been in search of a tool like this for some time," stated Phillips. "The collaboration of EPRI and its members led to the development of this tool. At a briefing, a number of utilities began discussing how this process could be done quicker and better. This research project was the result of our combined expertise, and an excellent example of the value of collaboration. Project participants made a number of recommendations and were active participants in the development process."

In working together with the participating utilities, manufacturers and industry experts, conductor cleaning of aged or dirty conductors was identified as a development issue for a number of reasons including the fact that effective cleaning requires unstranding of aluminum strands; effective cleaning requires cleaning of individual strands; unstranding is time consuming and difficult; unstranding and individual cleaning of strands may increase the risk of strand damage, decreasing the reliability of the connector.

Benefits

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.

"The conductor cleaner has been in development for three years, which is not a lot of time in the world of research," observed Phillips. "Some projects can go six to eight years before they are ready for application. It was especially satisfying to see the Southern team see it for the first time, start using it shortly thereafter and witnessing that the device was performing exactly as it was developed to do. That is really a credit to the expertise that went into the development of the tool."

GPC and contract crews cleaning the conductor using the conductor cleaner.

Close up of conductor cleaner in action.

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com)

CONTACTS

Andrew Phillips, *Director of Transmission Increased Power Flow*
704.595.2234; aphillip@epri.com

1018126 August 2008

Electric Power Research Institute
3420 Hillview Avenue, Palo Alto, California 94304-1338 • PO Box 10412, Palo Alto, California 94303-0813 USA
800.313.3774 • 650.855.2121 • askepri@epri.com • www.epri.com