Efficient Transmission

Tokyo Rope International Incorporation (TRI), Japan has developed a highly efficient high ampacity low sag conductor named Aluminium Conductor Fiber Reinforced (ACFR®).This technology was first implemented in a transmission line in Japan in 2002.This is the first carbon fiber composite conductor that has been deployed and tested in a transmission line. The specialty of ACFR® is that it uses stranded Carbon Fiber Composite Cable (CFCC®) which is more flexible and easy for installation. TRI owns the technology and license for manufacturing ACFR® conductors.

How is ACFR® different from other high tension low sag (HTLS) conductor technologies?

The selection of suitable HTLS technology depends on power transfer capacity, existing ground clearance, existing tower loadings and capital investment requirements. In addition, the operational efficiency (ohmic losses) over a periodof its lifetime and installation of these conductors in the existing terrain are the major parameters that need to be considered for choosing the right technology.

The carbon fiber composite core conductor technology has been preferred by the utilities among HTLS conductor technologies available because of its high strength to weight ratio, lower thermal expansion and no creep (almostzero creep). The popular composite core technology is mostly a single core or several number of single wires bunched together. But the challenge of this popular carbon fiber composite core conductor technology is flexibility, and thus, needs careful handling and care during installation.

After several years of research to address the challenges in the carbon fiber composite technology, we developed a technology to strand the carbon fiber composite material to form a stranded carbon fiber composite core (we are globally the first company to strand carbon fiber composite core). The stranded carbon fiber composite technology differentiates itself from other technologies in terms of flexibility and ease to handle during installation.

"We are launching the new product ACFR® Elephant to replace the existing ACSR Dog conductor in the transmission and distribution network."

Who is your present stranding partner in India and what are TRI's plans for the Indian market?

We have authorised JSK Industries Private Limited, as one of the stranding partners in India.

India is one of the biggest markets for HTLS technology. The Indian market is different from other Asian markets because of its test requirements for HTLS conductors and restricted qualification requirement. ACFR® is now tested as per Indian utilities' requirement and utilities are keen to deploy ACFR® conductors because of its easy installation. All the major Indian power transmission utilities have already used and know the benefit of carbon fiber composite core technology. However, during our interactions with several utilities, we found that they are still conservative regarding the flexibility of composite material technology and our stranded CFCC® will overcome the challenges. ACFR® is the most cost-effective solution for Indian utilities and we continue to invest to market ACFR® in India.

What have been the notable projects where ACFR® conductors have been installed and outcomes achieved?

The first ACFR® conductor was installed in 2002 by Tohoku Electric Power Co., Inc.of Japan. ACFR® helped the utility by increasing the power transfer capacity for a longer span without violating the existing ground clearance. Globally this is the first transmission line energised with carbon fiber composite conductor.

Our ACFR® conductors are in successful operation to increase the transmission capacity of several Chinese and Indonesian power transmission utilities. In fact, more than 800 km of ACFR® conductors are in successful operation today. ACFR® is the only technology with satisfactory operational experience of more than 15 years, among all the compositematerial conductor technologies.

"ACFR® is the first composite core conductor deployed in power transmission lines globally."

How can ACFR® conductors support distribution networks?

Our key differentiator is that our product lines are a best-fit for distribution lines. The distribution conductors for 33kV and below voltages are smaller in size, so the core diameter needs to be much smaller and aluminium shaped wire stranding for smaller size conductors becomes much more difficult. However, our core size product range starts from 2.6mm and as a stranded core, we can use round aluminium wire which makes ACFR® the best fit fordistribution conductors.

We are launching our ACFR® Elephant conductor equivalent to ACSR Dog conductor this July. The UDAY (Ujjwal Discom Assurance Yojana) scheme aims to increase the efficiency of discoms which includes a reduction in their losses. ACFR® conductor deployment in distribution lines can help reduce the ohmic losses or increase the capacity of overloaded lines by just replacing the existing conductors with ACFR® conductor in the existing pole.

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