



increasing OHL efficiency - AAAC UHC conductor

TenneT TSO is upgrading the transmission capacity of the existing 220 kV electricity connection between Zwolle and Groningen in the north of the Netherlands. This upgrade is necessary because the transmission capacity of the present grid infrastructure is insufficient to handle the expected increase in production in the near future. The capacity upgrade will allow small-scale wind energy and combined heat and power (CHP) initiatives, as well as new large-scale production capacity at Eemshaven, to be connected to the high voltage grid over the coming years.

The upgrade of the Vierverlaten - Zeyerveen - Hoogeveen - Zwolle route is scheduled for completion in the first half of 2011. At 110kV TenneT TSO is reinforcing the network by installing 2 new 110kV circuits on existing towers between Zwolle and Meeden.

Both projects are a part of an ambitious plan to build several new power links and high voltage substations in the provinces of Groningen, Drenthe and Overijssel.

Increasing efficiency

In 2008, TenneT TSO made plans to upgrade the transmission capacity using ACSR Bobolink conductor. This conductor has been used quite often in the Netherlands and was a standard product that could be taken off the shelf. While the ACSR is obviously a very reliable conductor with a track record dating back to the beginning of the 20th century, TenneT TSO decided to investigate whether this conductor would still meet the standards of the 21st century with respect to energy efficiency and environmental aspects.

The ACSR Bobolink is a conductor with a nominal diameter of 36.24mm and a total weight of about 2476g/m of which 393g/m steel. The goal was to check whether a much more efficient conductor giving the same or better performance and mechanical strength could be developed within this envelope.

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APPLICATION CASE



The solution

Having understood the requirements of TenneT TSO, Lamifil decided to go for an AAAC conductor with Ultra High Conductivity aluminium alloy. Lamifil started developing Extra High Conductivity alloys more than 10 years ago in response to the requirement by the NGTS standard in the United Kingdom, and supplied over 10000km since then.

To make to most out of the performance of the Ultra High Conductivity aluminium alloy, the AAAC UHC Bobolink developed by Lamifil consists of a combination of layers with round and trapezoidal shaped wires.

In the tender for the supply of these conductors, TenneT TSO included a formula to evaluate the offered conductivity together with a premium/penalty provision to be applied to the actual deliveries. A vast and elaborated test program for this new type of conductor was defined including specific type testing.



After a technical and economical comparison of all solutions on the table, and the calculation of the Total Cost of Ownership, TenneT TSO selected Lamifil's AAAC UHC Bobolink, which offered the following advantages:

- lowest Total Cost of Ownership
- increased transmission capacity
- reduced CO₂ emission
- no changes to the towers
- conventional installation procedure

Replacing the ACSR Bobolink conductor with AAAC UHC Bobolink conductor for this line should reduce losses by an estimated 19%. It should also reduce generation capacity requirements by 1548kW and save the emission of over 142 000 metric tons of carbon dioxide over a 30 year economic life. The cost saving is estimated at 678 000 Euro per year based on present energy costs.

Conclusion

Overhead conductors have long been a commodity product, manufactured in accordance with standards written ages ago. Improving the efficiency of conventional overhead conductors has hardly been looked at in recent years. Today more and more transmission and distribution system owners start paying attention to this subject. TenneT TSO is one of the leading companies in this respect and discovered that advanced overhead conductors will not only reduce the total cost of ownership of their network but also help reducing CO₂ emissions.

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