Chapter 12

HTLS Conductors: A Novel Aspect for Energy Conservation in Transmission System

Abhilash Netake
Dr. Babasaheb Ambedkar Technological University, India

P. K. Katti
Dr. Babasaheb Ambedkar Technological University, India

ABSTRACT

The power system has undergone multifold growth in its generation, transmission and distribution in past few decades. The types of conductors used for transmission system in India are ACSR / AAAC. These conductors have several constraints. The Ampacity of these conductors is less and hence they cannot be operated at high temperature also the losses in these type of conductors are more. To overcome the drawbacks of ACSR / AAAC conductors, this paper proposes a new approach of using High Tension Low Sag (HTLS) conductors, also a comparison is made between ACSR, AAAC and HTLS conductors on the basis of voltage drop and power loss for benefit evaluation of HTLS conductor over traditionally used conductors.

1. INTRODUCTION

The basic function of transmission system is to transfer electrical power from one location to another location. A transmission system include terminal substation, transmission line and intermediate substation associated control, protection, auxiliaries etc.

The Modern civilization depends heavily on the consumption of electrical energy for industrial, commercial, agricultural, domestic and social purpose. Electrical power is generated in large thermal hydro nuclear power station. The energy is transfer from this generating station to distant distribution network via transmission system.

DOI: 10.4018/978-1-4666-8737-0.ch012
The modern electrical power system is in form of large interconnected three phase AC network. The generating station, transmission system, and distribution system are interconnected to form three phase AC system operating synchronously at a common frequency of 50 Hz.

The electrical power system mainly aims at following:

- To supply required amount of power continuously over the entire geographical area.
- To provide maximum security of supply and minimum fault duration.
- To supply electrical power within targeted limit of frequency within a specified limit of voltage.
- To supply electrical energy economically.

Nowadays, power systems are extensively interconnected requiring the huge transfer of electric power. Considering that a typical transmission line with a certain voltage level, can only carry a limited capacity, to carry an enormous power it is required to construct extra high voltage (EHV) transmission lines.

Industrial-minded countries of the world require a vast amount of energy of which electrical energy forms a major fraction. This requires very high voltages for transmission. The very rapid strides taken by development of dc transmission since 1950 are playing a major role in extra-long-distance transmission, complementing or supplementing EHVAC transmission. They have their roles to play and a country must make intelligent assessment of both in order to decide which is best suited for the country’s economy.

The demand for electricity has been increased due to vast industrialisation and also due to the increased domestic consumers. To fulfil this increased demand for electricity, the transmission network must be robust and have enough capacity to carry the maximum amount of power generated to the load area. The power handling capacity of 400 kV is falling short of and is not sufficient to fulfil the increased demand. To fulfil the increased demand for electricity and to carry the maximum power generated at the power station to load centre it has become necessary to find out the best possible solution. For this it is necessary to study drawbacks of the existing system and to go for new technologies which can fulfil the requirement.

This paper has proposed one of the technique i.e. reconductoring of the existing transmission network to overcome the problems of the existing system. The reconductoring of the system can be done with the help of HTLS (High Tension Low Sag) conductors which has been described in the paper. By using the new HTLS conductors the loss minimization throughout the transmission network can be achieved also the voltage drop can also be reduced so improvement in voltage regulation can be achieved. This paper proposes this technique for the energy conservation purpose throughout the transmission network.

2. TECHNICAL REQUIREMENT FOR DESIGN OF TRANSMISSION NETWORK

For capacity enhancement of transmission line different option available are:

A. Improvement of Transmission System

This part of the transmission network design requires various calculation to be completed for efficient transmission of power. This part is important to understand the level of safety required during the operation of the network and various clearances to be considered after selection of the voltage level for transmission.
Related Content

Incremental Algorithm for Discovering Frequent Subsequences in Multiple Data Streams
[www.igi-global.com/chapter/incremental-algorithm-discovering-frequent-subsequences/70801?camid=4v1a](www.igi-global.com/chapter/incremental-algorithm-discovering-frequent-subsequences/70801?camid=4v1a)

ASCCN: Arbitrary Shaped Clustering Method with Compatible Nucleoids
[www.igi-global.com/article/asccn-arbitrary-shaped-clustering-method/46940?camid=4v1a](www.igi-global.com/article/asccn-arbitrary-shaped-clustering-method/46940?camid=4v1a)

Big Data Analytics: A Necessary Roadmap for Enterprises
[www.igi-global.com/chapter/big-data-analytics/218739?camid=4v1a](www.igi-global.com/chapter/big-data-analytics/218739?camid=4v1a)

Finding the Semantic Relationship Between Wikipedia Articles Based on a Useful Entry Relationship
[www.igi-global.com/article/finding-the-semantic-relationship-between-wikipedia-articles-based-on-a-useful-entry-relationship/188489?camid=4v1a](www.igi-global.com/article/finding-the-semantic-relationship-between-wikipedia-articles-based-on-a-useful-entry-relationship/188489?camid=4v1a)