Life cycle assessments of extruded AC and DC power cable systems

Dominik **HÄRING** (1), Gero **SCHRÖDER**, Christoph **SAAM,** Andreas **WEINLEIN,** Axel **BOSSMANN**

1 Südkabel GmbH, Mannheim, Germany, dominik.haring@suedkabel.com

The growing industrialization requires an increasing responsibility of industry and manufactures for its influence on environmental impacts. Electric power cables take a fundamental part in distribution and transmission of electrical energy for a reliable energy supply in the future. Higher power ratings require higher system operation voltages and currents. Power cables with weights up to approx. 60 kg/m are necessary to meet those requirements of the increasing energy demand. This shows that the question of sustainably manufactured products like power cables is appropriate. However, because of a complex and complicated production process, the analysis of the environmental impacts of a cable manufacturing process needs a detailed investigation of the used materials, processes and operation stages.

For a sustainable manufacturing of power cables a life cycle assessment (LCA) is helpful. LCA is a systematic investigation of a product and its environmental impacts. The system boundary of a LCA depends strong on type of product and the available information and data.

This paper describes a developed method to investigate the environmental impacts of a cable manufacturing process. The main focus of the LCA is on the carbon dioxide footprint and energy demand. In a first step the production of raw-materials used for the cable manufacturing has been analyzed. Several data and information have been collected and evaluated. Those data are the basis for further considerations of the LCA.

In a second step, each production stage in the cable manufacturing process has been investigated. Detailed measurements of the energy consumption of each process have been carried out and analyzed. Thereby, the focus is on the energy-intensive processes as stranding, extrusion, tempering, sheathing, and testing. The obtained data and information have been evaluated and translated in a carbon dioxide footprint. The result of the production LCA will be discussed.

The investigation of the environmental impacts of a cable manufacturing process has been carried out on two different cable types. Thereby, at first a HVAC power cable of type 2X(F)KL2Y 1x2500 RMS 300kV has been investigated. In a second step a HVDC cable with similar geometric dimensions and weights has been investigated. The developed LCA of both cable types enables a general comparison between the manufacturing process of HVAC and HVDC cables. The differences between HVAC and HVDC cable manufacturing will be discussed and evaluated in terms of a sustainable development process for new products.

Furthermore, fundamental considerations regarding the environmental impacts during the operation stage of a cable system have been carried out. The main focus is on the magnetic fields and influences caused by the conductor temperature of the cables. Both considerations have been carried out and compared for HVAC and HVDC cable systems.