Subsea and EHV cables require a challenging purity degree of XLPE-material

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A chain is only as strong as the weakest link. With regard to cables the weakest point is the cable joint. In addition, it is contamination inside the insulation, and where accordingly the stress over time causes a discharge. As a consequence, the capability to produce long cable lengths is one of the challenges manufacturers of subsea and EHV cables face. Furthermore, the purity of the material has to be on the highest degree. It is for good reasons that compound suppliers offer an extra-clean material for the production of EHV cables, but there is also a continuous online supervision of the process required for complete quality assurance.

In the paper SIKORA will introduce different technologies that assure the purity of subsea and EHV cables at specific stages during the production process.

Methods that are used until today to inspect a certain percentage of the polyethylene material, either directly at its production or on site at the cable manufacturing, do not meet today's requirements. In particular, these sample tests only examine the pellet of the raw material from its outside. All contaminants that may as well be inside the pellet remain undetected. We will introduce a system that inspects the polyethylene material inside and outside for contamination. This is achieved by combining X-ray technology with an optical system. Contaminated material is sorted out before it is processed in the extruder, thus assuring a 100% quality control.

A second challenge during the production of EHV cables is the detection of contamination, which occur from the extrusion process. These are mainly contamination resulting from cleaning the screw and barrel and from a partly overheating of the material, which leads to scorches and ambers. Moreover, there is always the risk of getting smallest particles from the screw into the polyethylene melt. In this context, we will present a camera system that examines the polyethylene melt for purity in the flow channel directly before the crosshead. A high-speed CCD camera trans-illuminates the insulated material and informs about contamination. In comparison to the pellet inspection system, which detects impurities in and on the pellets, the camera system informs if the polymer melt flow is free from contamination.

A third aspect that has to be taken under consideration when manufacturing EHV as well as subsea cables is the careful supervision of the melt temperature. We will focus on a system based on ultrasonic technology that measures the temperature of the polyethylene melt between the extruder screw and the cross head during extrusion. We will outline the advantages of ultrasonic technology for melt temperature measurement compared to the use of thermo couples. Besides temperature determination, the system detects inhomogeneities in the melt. Early cross linking after screens, which may lead to ambers or scorches in the material is avoided.