

Interaction of online and offline inspection, sorting and analysis to ensure highest material quality and process optimization during power cable production

Aguinaldo RAMALHO, Rebecca ZACHAU; SIKORA AG, (Germany), communications@sikora.net

□ **Young Researcher** (Proved full-time engineering and science university researchers and Ph.D.students under 35 YO)

ABSTRACT

The purity of XLPE and PP pellets, used for the insulation of power cables, is a key characteristic for the quality of the end product. Any metallic contamination in the cable insulation might lead to a breakdown. Besides, cable parameters should adhere to the required cable specifications while considering a minimum material consumption in order to save materials and costs. In this paper, different measuring and control devices as well as inspection, sorting and analysis systems are presented for quality control both inline and offline to ensure the highest quality of the power cables.

KEYWORDS

Non-destructive quality control, inline inspection and sorting, offline inspection and analysis, process optimization, cost and material savings

INTRODUCTION

The purity of XLPE and PP pellets, used for the insulation of power cables, is a decisive characteristic for the quality of the end product. Breakdowns that are caused during the discharge test, due to contaminated material, can easily cause high value losses in the six-digit range. Therefore, the use of pure material as well as the continuous detection and sorting of contaminated pellets before they can enter the extrusion process is of essential importance.

In addition, cable manufacturers aim at producing large cable lengths with as few cable joints as possible in order to set the prerequisite for long-lasting cables with a lower risk of breakdowns. The different cable parameters should adhere to the required cable specifications while considering a minimum material consumption in order to save both materials and costs.

A continuous inline quality control is therefore necessary for power cable manufacturers to ensure the highest quality of the power cables and to achieve their goals. In the following, different measuring and control devices as well as inspection, sorting and analysis systems are presented for quality control both inline and offline (fig. 1).

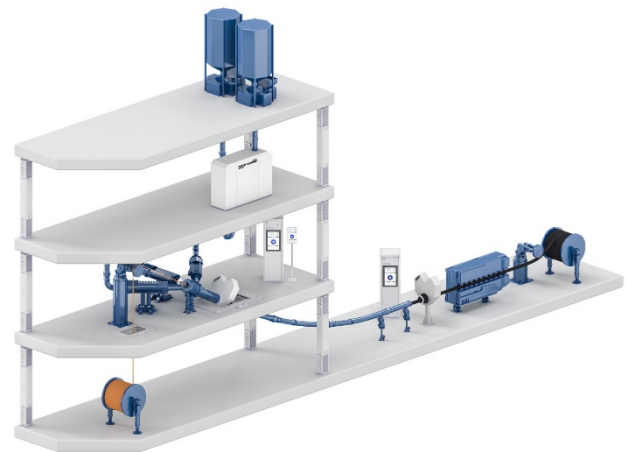


Fig. 1: Overview: quality control in a CV line

ONLINE INSPECTION AND SORTING OF THE RAW MATERIAL PRIOR TO PRODUCTION

XLPE and PP pellets are commonly used for the insulation of power cables. Their purity is of utmost importance in order to achieve a reliable end product of the highest quality. There are different reasons why contamination can appear in the raw material. They can occur at the supplier's site; e.g. due to incorrect handling in packaging, pellets can get contaminated. Besides, contamination can arise that is process-related and thus, cannot be fully avoided. For instance, visual defects on plastic pellets, like e.g. black specks or discolorations appear due to hot temperatures in the extruder. Especially metallic contamination poses a high risk for power cable manufacturers as they threaten the functionality and the reliable operation of the final product. The cables have to be insulated with a 100 % metal free polymeric insulation. Otherwise, breakdowns could occur at any time (fig. 2).

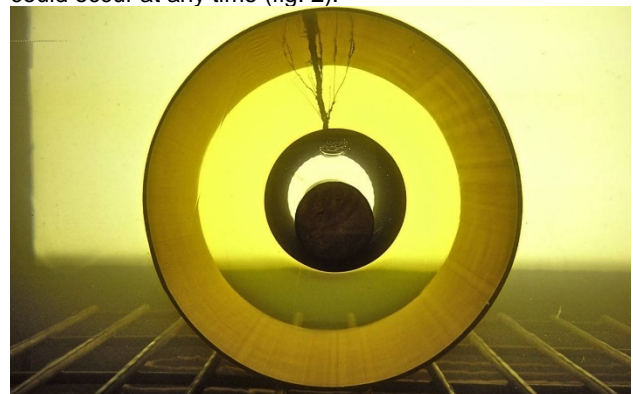


Fig. 2: Cross section of an extra-high voltage cable with discharge