Faculty of Electrical Engineering & Computer Science
Master Degree Course Electronics Engineering, MSc EE

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Cross-Talk Investigation on Low Voltage Twisted Screened Quad Cables for the Offshore Umbilical Application.

ABSTRACT - Masterthesis

Crosstalk is one of the important parameters that determine the cable performance. Crosstalk means the electromagnetic interference between two or more parallel cables. Practically this is an undesired electromagnetic interference called noise. One of the solutions to reduce the crosstalk is to twist the cable. The two cables carry equal and opposite currents through them. The interference produced by one cable will be cancelled by the interference produced by the other cable. This is because of equal and opposite in nature.

The Norddeutsche Seekabelwerke GmbH had unexpected high crosstalk in some "Twisted Screened Quad" cable. In offshore umbilical applications (e.G. Oil & Gas) the TSQ is used for transmission of electrical energy or high frequency signals over distances of up to 150 km. For the transmission two opposite insulated conductors are used as pair for a voltage in the range of ±1000V and with a frequency in the range of 1kHz to 100kHz. Due to inductive and capacitive coupling an undefined voltage is induced in the other insulated conductor pair. This low voltage cables shall not exceed predefined acceptance criteria for crosstalk. The cross talk will be influenced by mechanical and physical properties of the cable design, the fabrication and the situation of the cable. Additionally, further influence can be between the layers as well as signals from the outside which need to be investigated as well. The investigation will contain theoretical analysis with analytic calculations and/or simulations (e.g. by use of the Finite Element Method (FEM)) as well practical investigations based on measurements.