

Master 2015

Sebastian Hess

Development of an Additional Health-Monitoring Systems for the Power Electronics of the COSIVU-Sensor.

ABSTRACT - Masterthesis

In electrical Systems apart of the energy is lost due to dissipated heating. This heating loss is much higher in power electronics and must be compensated via efficient cooling processes. The thermal management of electronic components is particularly important in a hot operational environment, since through constant thermal stress the lifetime of the systems is reduced significantly.

In this master thesis the development process of an algorithm to predict the life time of a power inverter by the assistance of electronic and thermal analysis procedures is described. Considering general physical descriptions of power loss in electronic components, the inverter is investigated regarding its electrical behavior to work out an efficient method to determine the losses during operation.

Afterwards the system is investigated towards thermal characteristics. Each subsystem is described by several methods to develop an algorithm for the prediction of the intrinsic temperature. With this temperature value and a sophisticated empirical computing method the durability and the decrease of lifetime can be predicted. The feature about this method is the systematic approach; the measuring points are located in the implemented cooling cycle. One is measuring the intake temperature, one the drain temperature. These two points together with the performance monitor of the system shall be sufficient to calculate efficient results with the health monitoring algorithm.