PC-based Control: seamless integration of measurement technology
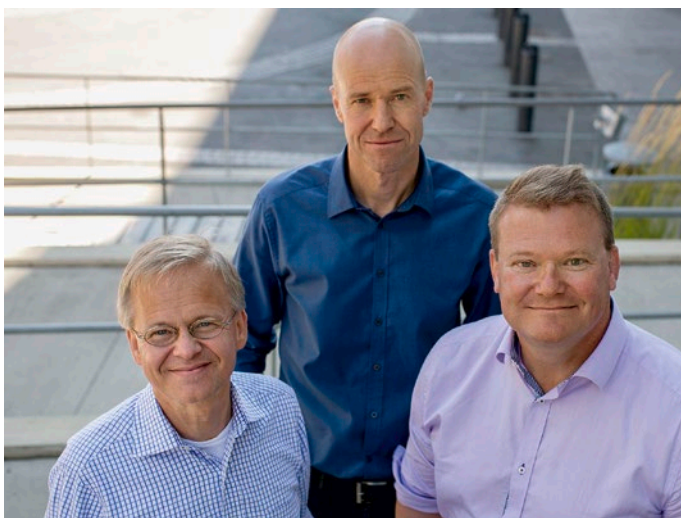
Intelligent electrical grids prevent power failures

Increasing energy consumption and the massive expansion of renewable energies often lead to destabilization of the electrical grids in Sweden. Not only that, there are also region-specific difficulties, since the overhead cables run for many kilometers through dense forest and unstable ground is commonplace. Power failures affecting several thousand private households and numerous companies can result in high costs, presenting power supply companies with a significant challenge. In order to mitigate power fluctuations or failures, the Swedish company, dLaboratory Sweden AB has developed a technology that detects and reports disruptions at an early stage before they lead to grid failures. The seamless integration of the measurement technology in the PC-based control platform plays an important part in this.

Power failures are generally preceded by small interferences that can stem from a wide range of factors. Old power lines can cause additional problems; compounding this issue, overhead cables that lead through forests are also susceptible to interference from vegetation. For example, trees that fall over or grow too high cause short-circuits and grounded cables, leading to grid disruptions. The smart grid system developed by dLaboratory consists of the dBox, which is equipped with an Internet-connected measuring system and dAnalysis, the analysis software that collects and automatically analyzes the measured data from registered grid disruptions. The dBox registers every deviation in the grid, analyzing the data in the cloud. The electricity supplier receives periodic grid status updates via email, enabling the company to identify errors quickly and initiate remote preventive repair measures. This results in higher reliability and quality in the electricity supply.

„The user can make changes to the web interface settings in the analysis device, enabling automatic analysis of various measured value groups," explains Dr. Magnus Akke, founder of dLaboratory. A search can be performed in the database for the analysis results, which can then be checked to determine any necessary actions. They are presented in the form of a list containing details of protective measures, or as a time diagram for a single entry with the possibility to zoom in.

The measuring system is controlled by a CX2040 Embedded PC with TwinCAT 3 automation software, directly connected EtherCAT Terminals for the measurement of voltage and current, as well as for signalling. The EL3702 XFC terminal with oversampling functionality provides data acquisition, and the Embedded PC processes the data, saves them and communicates with the cloud.

The Swedish company, dLaboratory Sweden AB, founded in 2010 by Dr. Magnus Akke, Frederik Akke and Lars Wollung (from left to right), has developed a technology using which disruptions in electrical grids can be detected and reported at an early stage before they lead to grid failures.

Further information:
www.dlaboratory.com
www.beckhoff.se