

# MAKSIM

## Measurement, information and communication technology for the digitalization of the asset management of distribution networks

Fraunhofer FIT, Maschinenfabrik Reinhausen GmbH, Robert Bosch GmbH and RWTH Aachen University are developing a cost-effective measuring system for monitoring the condition of energy supply networks in the distribution network as part of the MAKSIM project, which is funded by the Federal Ministry of Economics and Energy. With the measuring and diagnostic system, a contribution to a more foresighted and efficient maintenance and renewal planning of the medium- and low-voltage equipment park is to be made in the future.

The current maintenance and renewal planning of the distribution network operators is often based on empirical values, expert knowledge and statistics. The assessment of the condition of the equipment in the field is carried out by trained specialists in regular on-site inspections at intervals of several years. The condition assessment, which is dependent on the experience of the inspection personnel, is already reaching its limits today. Often a pure visual inspection of the equipment is carried out, which makes an objective evaluation of the equipment condition impossible. The use of a measuring and diagnostic system offers a possible meaningful supplement. A large area data acquisition and analysis of the utilization of network resources by monitoring systems offers the possibility to optimize the current maintenance and renewal planning and additionally enables the network operator to develop completely new business processes, methods and strategies.

Monitoring systems for monitoring equipment are already being used successfully at the high and extra-high voltage level. However, these systems are not used in the medium and low voltage range. The reason is both the high costs of the monitoring system compared to the investment costs of the equipment to be monitored and the high number of local network stations compared to high and extra-high voltage installations. Sensor solutions are known from industries far removed from energy technology, which in turn are subject to positive economies of scale due to very high unit numbers. These sensors are already used in the automotive, consumer or process industries and integrate the associated signal processing and communication interface in addition to the sensor. The applicability of these micro-electromechanical sensors (MEMS) will be investigated in this project in the area of local network stations for monitoring operating resources.



Abbildung 1: Zentrum für Netzintegration und Speichertechnologien der RWTH Aachen

Within the framework of the MAKSIM funding project, the IFHT is working on the development of a laboratory environment that will enable the development of cost-effective sensors for medium and low voltage equipment. Both the normal operation and the faulty operation are to be investigated. In order to simulate the specific influence of errors occurring in medium and low voltage, a laboratory environment will be set up which allows the specific manipulation of equipment. In the laboratory environment, measurement methods based on cost-effective MEMS sensors will be developed. The developed measurement methods will be tested in verification experiments between conventional, high-resolution measurement technology and measurement technology based on MEMS sensors at the Center for Network Integration and Storage Technologies of the RWTH Aachen University. A special challenge is the communication connection of the local network stations. Local network stations are often stationed in areas with difficult communication technology, such as basements of buildings or in very rural regions where there is insufficient communication between the local network station and the control centre. A Smart-Data approach is therefore being pursued within the framework of the funded project. In cooperation with Maschinenfabrik Reinhausen and Robert Bosch GmbH, the aim is to reduce the measurement data by developing sensor-related algorithms in the area of the local network station, so that the amount of data to be effectively transferred to a data and analysis platform can be significantly reduced. The IFHT accompanies the final field test with the distribution network operators involved in this project to demonstrate the usability of the measurement and diagnostic system developed in this project. The aim is to identify environmental influences and, if necessary, to adapt the measurement and diagnosis system.

## Project information



### Partners

- Maschinenfabrik Reinhausen GmbH
- Robert Bosch GmbH
- Fraunhofer FIT
- Rheinische Netzgesellschaft mbH (assoziiert)
- Main-Donau Netzgesellschaft mbH (assoziiert)
- INFRAWEST GmbH (assoziiert)
- Fritz Driescher KG (assoziiert)
- Institut für Hochspannungstechnik



### Facts

- Acronym: MAKSIM
- Duration: Sep. 2018 – Sep. 2021

Supported by:



on the basis of a decision by the German Bundestag

## Contact

**Andre Würde, M.Sc.**

Research Assistant

[wuerde@ifht.rwth-aachen.de](mailto:wuerde@ifht.rwth-aachen.de)