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60 kW transformer with fault current limiter function tested successfully

Applicable power level is the next target

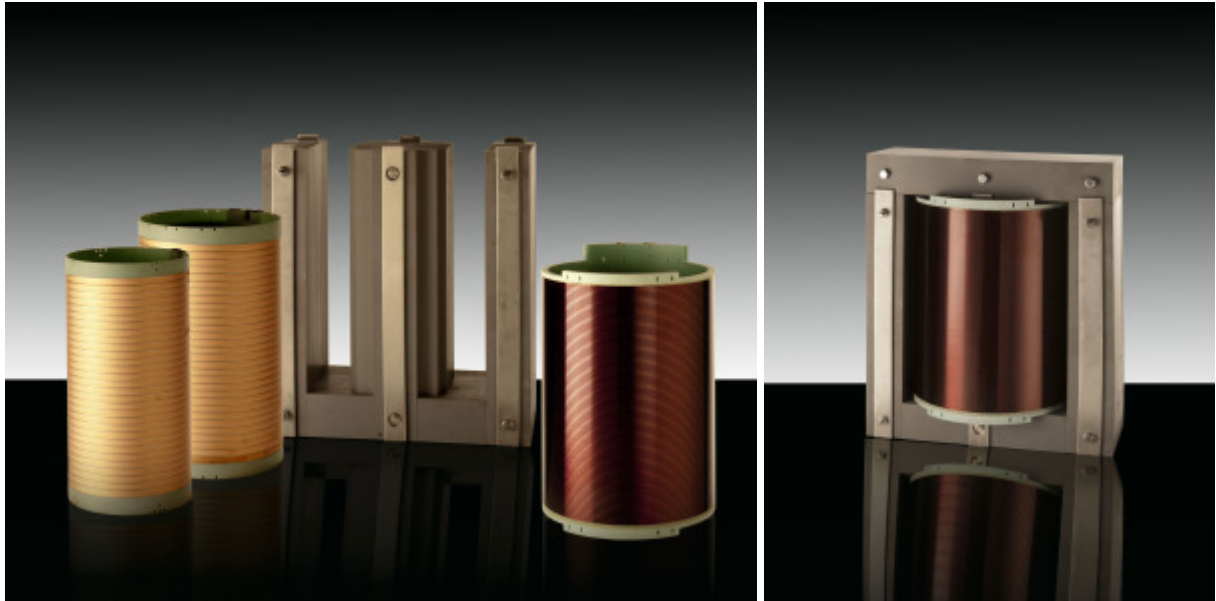
The integration of High Temperature Superconductors (HTS) into future power systems is part of the general road map of efficient and environmental friendly use of energy and is one of the central challenges of the Institute for Technical Physics at Karlsruhe Institute of Technology. Reliability, efficiency and safety under operation are of the most important requested features to introduce such an innovation in comparison to the conventional technology. HTS technology provides unique methods to manage fault currents resulting from a grid overload with the so-called Fault Current Limiter (FCL), a device with the new functionality of an automatic management of fault current events followed by a reset for the next event. The KIT is actually developing HTS-FCL as prototypes together with industrial partners for final operation in the real grid. The research implies the characterisation, modification and specification of the HTS materials themselves. Test laboratories for the HTS and in particular for the components are provided by KIT and the R&D is performed with research partners, industries and power companies in a national and European dimension.

Focussing on the general goal for the future, a widespread superconducting grid structure in urban cities, the inherent protection of all different components by a "Fault Current Limiting Function" is one of the most important challenges. At the trade fair "Hannover Messe" 2011 KIT is presenting a small demonstrator model of a 60 kW transformer with FCL-Function, which was developed and tested successfully. Coming up projects together with industrial partners will already address transformer demonstrators at an applicable power level.

Also HTS power cables, important part of the superconducting urban grid of the future, are of high interest for urban areas to provide power peaks concentrated at different spots with large request. Power cables are also very suitable for the integration of the FCL function, to provide an inherent safe operation under the changed conditions in the grid of the future. Renewable energy, in particular wind energy, will replace Nuclear Power, but will ask for a simplified structure and large flexibility of the grid to feed in, store and distribute the more and more very discontinuously delivered energy. On the user side, the upcoming electro-mobility also contributes to very discontinuous use of electrical power, reinforcing the problems in the grid management in future with implementation of the smart grid management. KIT is active in this field, open for

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further cooperation and provides the complete spectrum of HTS material know-how, innovative HTS grid technology together with R&D on the Smart Grid concept.



Further information / press contact

Karlsruhe Institute of Technology (KIT)
Dr. Wilfried Goldacker
Hermann-von-Helmholtz-Platz 1 Buildg. 256-210
76344 Eggenstein-Leopoldshafen (Germany)
Tel.: +49 (0)721 608-24179
E-Mail: wilfried.goldacker@kit.edu
www.kit.edu