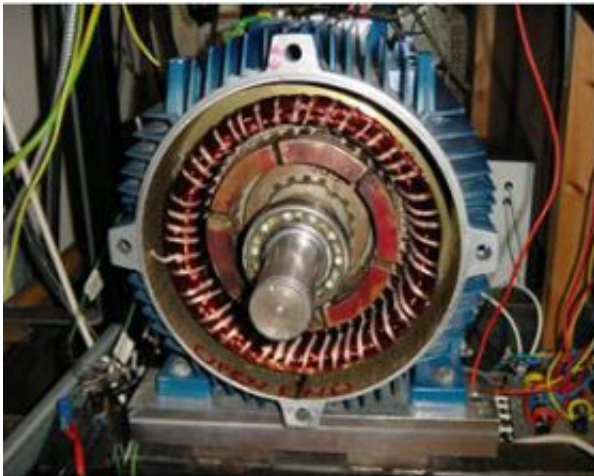


New technology improves the reliability of wind turbines

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Laboratory prototype BDFG

The world's first commercial Brushless Doubly-Fed Generator (BDFG) is to be installed on a 20kW turbine at or close to the University of Cambridge Engineering Department's Electrical Engineering Division Building on the West Cambridge site by early 2008. This will help the University meet its obligations under new legislation, which requires a new building to obtain ten percent of its electricity from renewable sources.

The research team, led by Dr Richard McMahon, have developed a new generator technology for the wind turbine industry to the point of commercial exploitation. This type of generator can be used in a wide

spectrum of wind turbines ranging from multi-megawatt systems for wind farms down to micro turbines used for domestic power generation.

Research in Cambridge on this type of generator was started by Professor Williamson in the 1990s and, since 1999, is now being undertaken by Richard and his team. The team are collaborating with Durham's Head of Engineering, Professor Peter Tavner. The research has recently matured, enabling practical and complete designs to be made with confidence. Wind Technologies Ltd has recently been founded to exploit the technology.

"We are very excited about the new installation. This will be the first time BDFG is to be used commercially. The benefits to the wind power industry are clear: higher reliability, lower maintenance and lower production costs" recalls co-researcher and Managing Director of Wind Technologies, Dr Ehsan Abdi. "The West Cambridge medium size turbine should successfully demonstrate the applicability of the new generator, and we hope it will encourage the developers of other new construction projects to consider local wind-powered electricity generation to meet their obligations", adds Ehsan.

On a larger scale, a 600kW generator built by Wind Technologies is to be tested on a DeWind turbine in Germany, starting next spring. Its planned one-year test should demonstrate the improved performance of the BDFG technology to the key players in this industry. "This will put Wind Technologies in a position of strength in pursuant discussions on technology trade sale, licensing or partnering with large generator manufacturers, which is the strategy of choice for tackling this concentrated marketplace", says Ehsan.

A contemporary Brushless Doubly-Fed Machine (BDFM) is a single frame induction machine with two 3-phase stator windings of different pole numbers, and a special rotor design. Typically one stator winding is

connected to the mains or grid, and hence has a fixed frequency, and the other is supplied with variable voltage at variable frequency from a converter.

In the majority (more than 90%) of newly-installed wind turbines in the world, generation is from a slip-ring generator. There are drawbacks to the use of slip-ring generators, particularly the additional cost and bulk of a machine which incorporates slip-rings and the need to maintain brush-gears including replacement of the brushes on a regular basis. Studies have shown that problems with brush-gear are a significant issue in wind turbine operation and reliability, and that the problem will be more severe in machines deployed offshore where there are stronger winds and accessibility is impaired.

The project received the Scientific Instrument Makers Award and the Cambridge University Entrepreneurs Business Idea Award in 2004. In 2005, the Institution of Electrical Engineers, now the Institution of Engineering and Technology, added its Innovation in Engineering Award. The company has recently received grants from Cambridge University Challenge Fund and East of England Development Agency to carry out market assessment, file patents and complete the pre-production prototype.

Harnessing wind power for electricity generation is becoming ever more common, both by large-scale wind farms, and increasingly by small domestic installations, with the UK the world's leading market for micro wind generation. "We hope that our generator, through offering high reliability and low maintenance, will significantly contribute to the wider adoption of wind power generation, particularly in offshore developments. This will lead to significant reductions in CO₂ emission and further reduce our dependency on fossil fuels" says Ehsan.

For further information the Electronics, Power and Energy Conversion

group web pages can be found at: www-g.eng.cam.ac.uk/epec/

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