

PM generator integrated designs

Innovation description

Lightweight direct-drive integrated generator concepts.

Ironless PM generator:

- Design strategy and tools for systematic investigation of different ironless PM generator concepts
- The generator concept has been thoroughly described in poster presentations, oral conference presentations, and journal publications by PhD candidate Zhaoqiang Zhang co-authored by Alexey Matveev (SmartMotor).

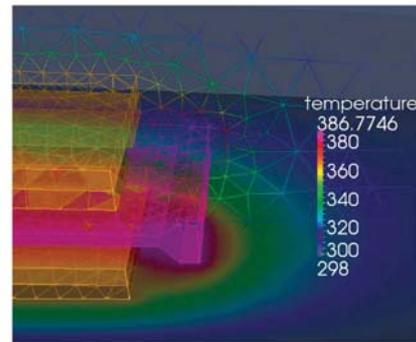
Modular generator/converter for transformerless offshore wind turbine:

- The innovation represents, when fully developed, a step change in offshore wind turbine technology, enabling the power from large offshore wind turbines to be transported to shore without the use of any expensive offshore substation.
- NOWITECH Innovation Award 2015 was given to Sverre Gjerde and Pål Keim Olsen for having carried out critical work in bringing this innovation forward as part of their PhD work at NTNU on high voltage DC generator technology for offshore wind turbines. They have demonstrated the technology in laboratory scale, and their work is well documented. Their work has been inspired and carried out with support mainly from NTNU, SINTEF Energy Research, SmartMotor and the Research Council of Norway.

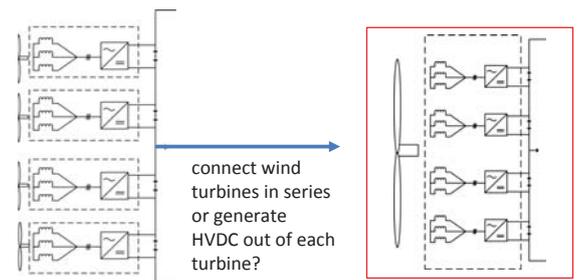
This knowledge and tools can be used to achieve integrated generator design with minimal weight per MW

Impact

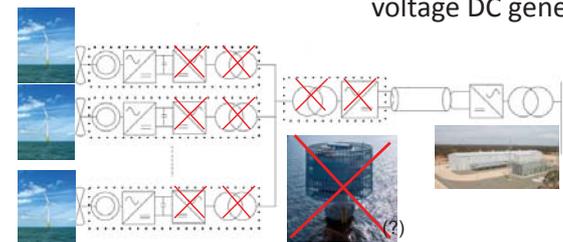
- Reduce generator weight per MW
- The development has been done in collaboration with SmartMotor



Modelling temperature distribution in generator



Transformerless high voltage DC generator



Large potential for cost reduction

References

- Z. Zhang, A. Matveev, R. Nilsen, A. Nysveen, A. IEEE Transaction of Industry Applications 50 (2013) 2, DOI: 10.1109/TIA.2013.2289983
- S. S. Gjerde, P. K. Olsen, K. Ljøkelsøy, T. M. Undeland, IEEE transactions on industry applications 50 (2014) 2. DOI: 10.1109/TIA.2013.2272032