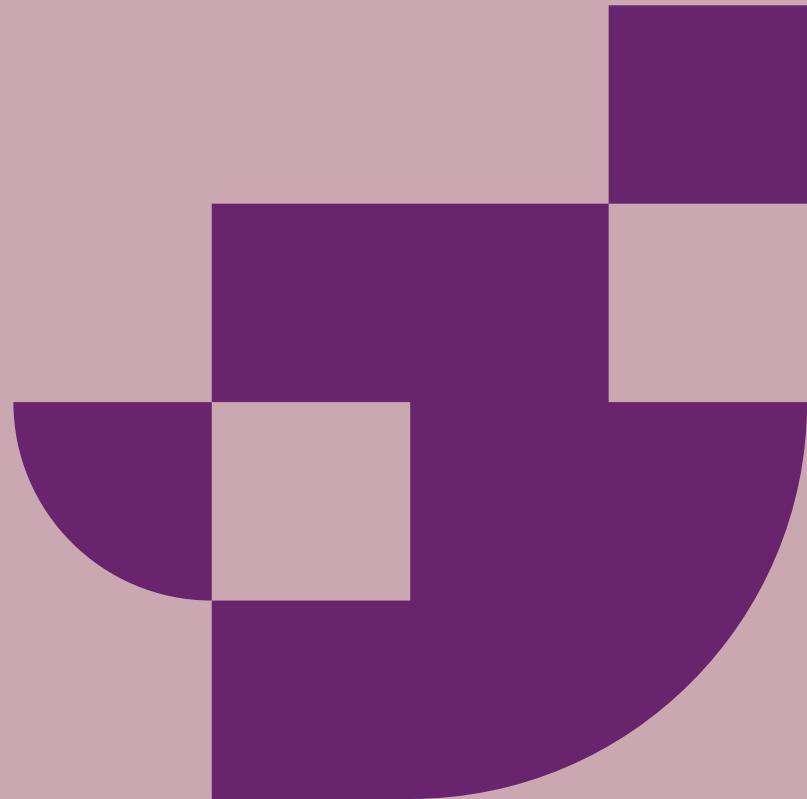


SUPERGEN Wind at Durham University

A few highlights from SUPERGEN Wind

Dr Christopher Crabtree
c.j.crabtree@durham.ac.uk

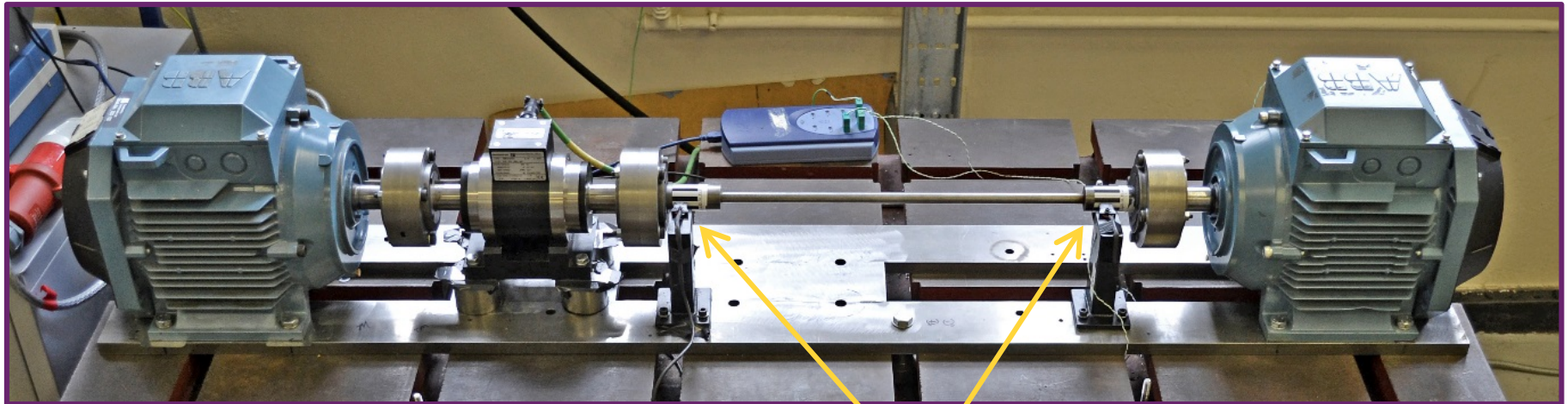
6th November 2019



Durham and SUPERGEN Wind

- Involved since SUPERGEN Wind's inception
 - Lead partner in Phase 1, Phase 2 and the Hub
- Focus on reliability, condition monitoring and performance
 - Electrical machine and drive train fault detection
 - Turbine reliability assessment
 - Reliability and operational simulation
 - Connection studies and reliability

Optical Torque Measurement



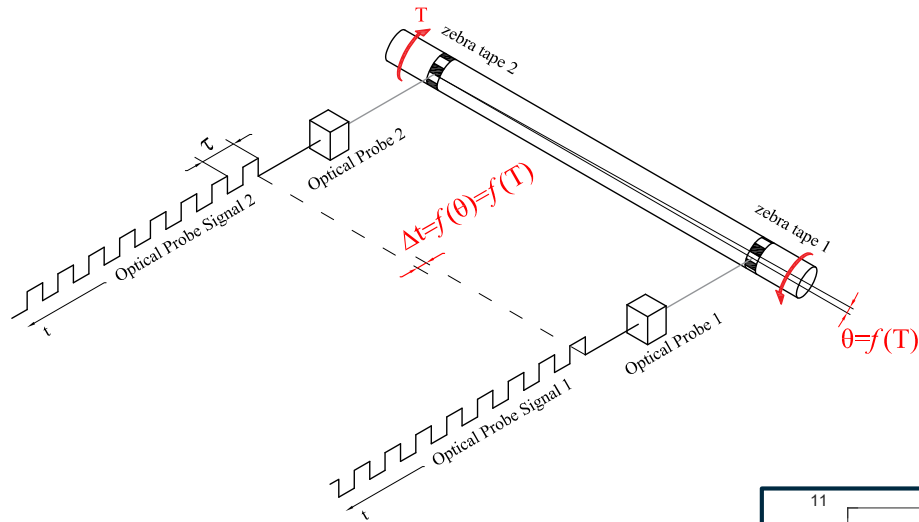
Speed-controlled
Induction Motor

Torque Transducer
(reference)

Barcodes and
Optical Probes

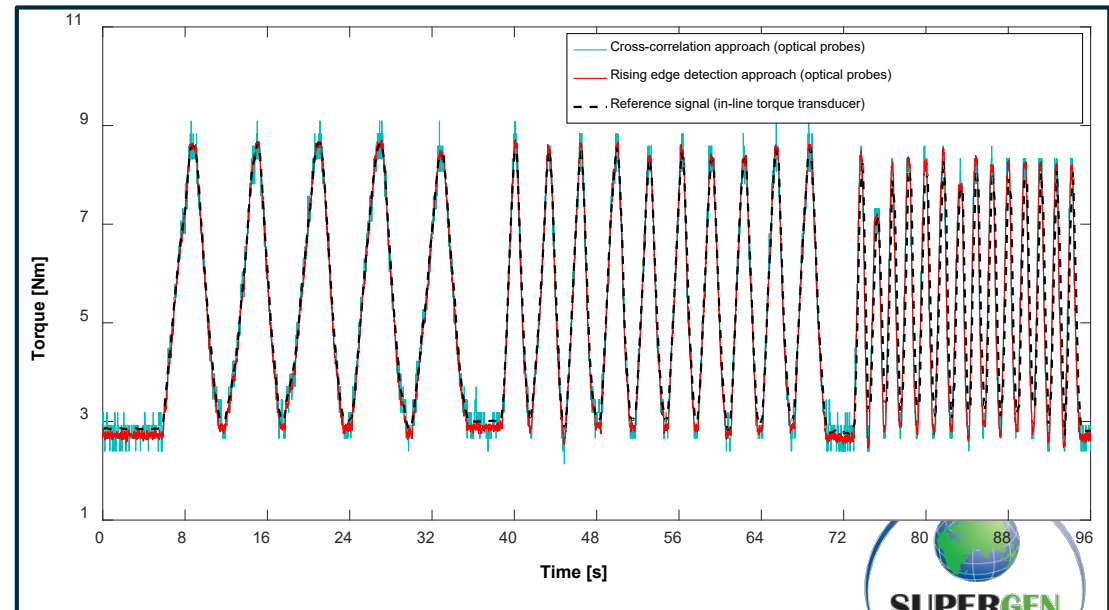
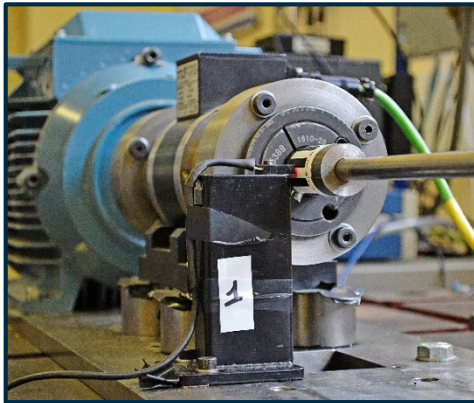
Grid-connected
Induction Generator

Optical Torque Measurement



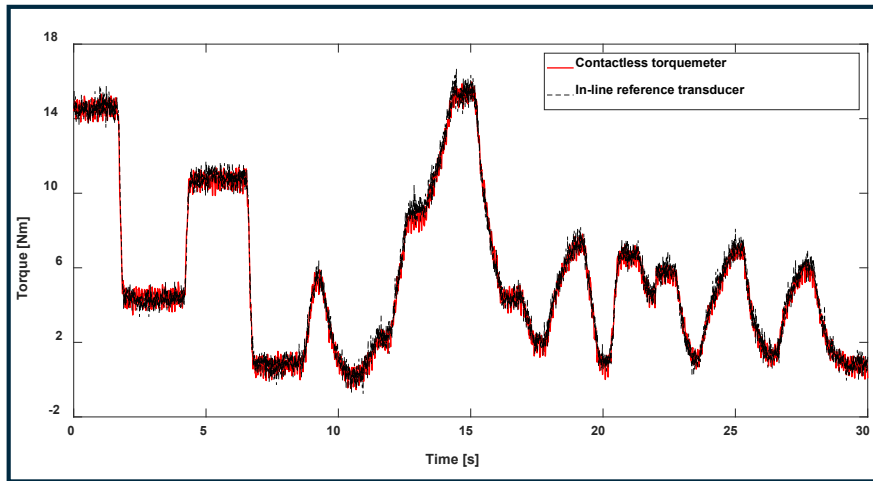
Provides torsional loading information in a non-invasive, cost-effective solution

Time shifts analysed using either edge analysis or cross-correlation

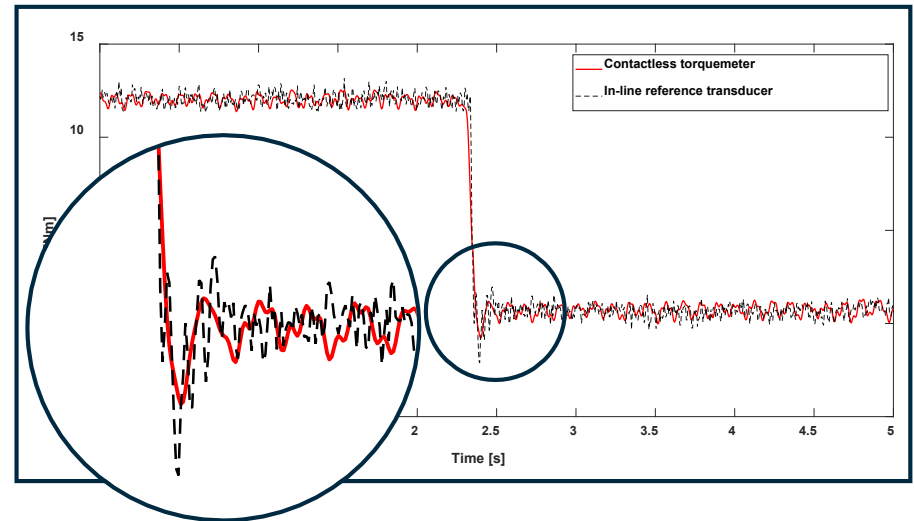


Optical Torque Measurement

- Long-term mechanical torque measurements for understanding WT dynamics and for condition monitoring
- Direct measurement of the shaft dynamic behaviour under critical transient conditions

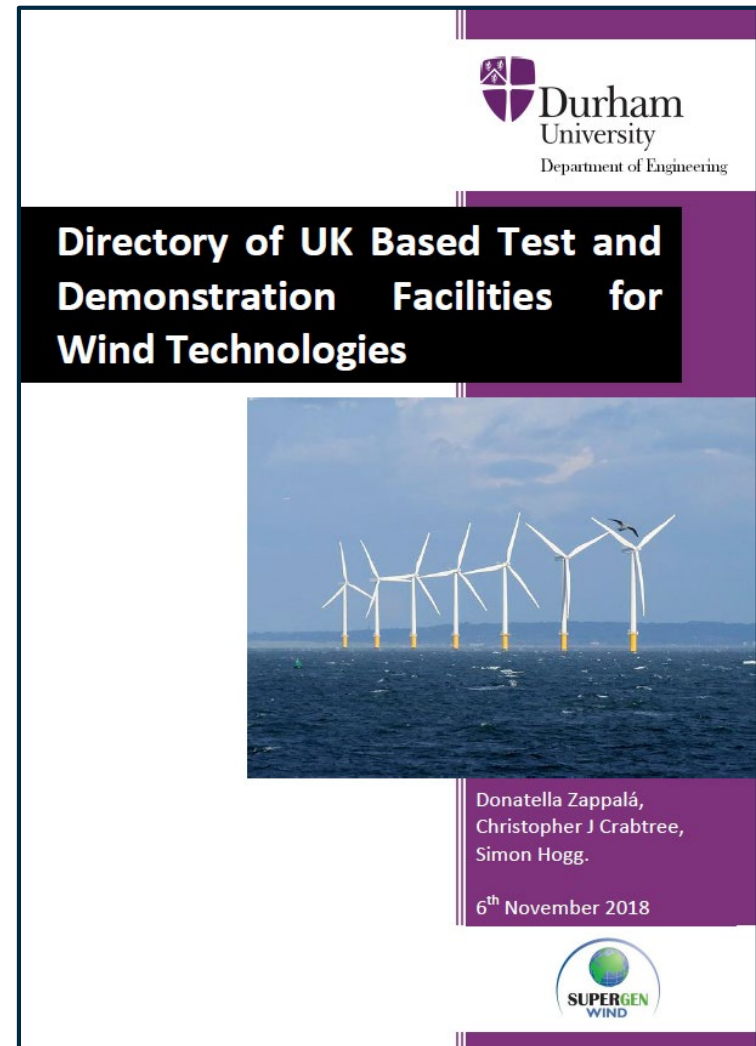


Turbulent torque oscillations



Drastic shaft torque reduction

Publications

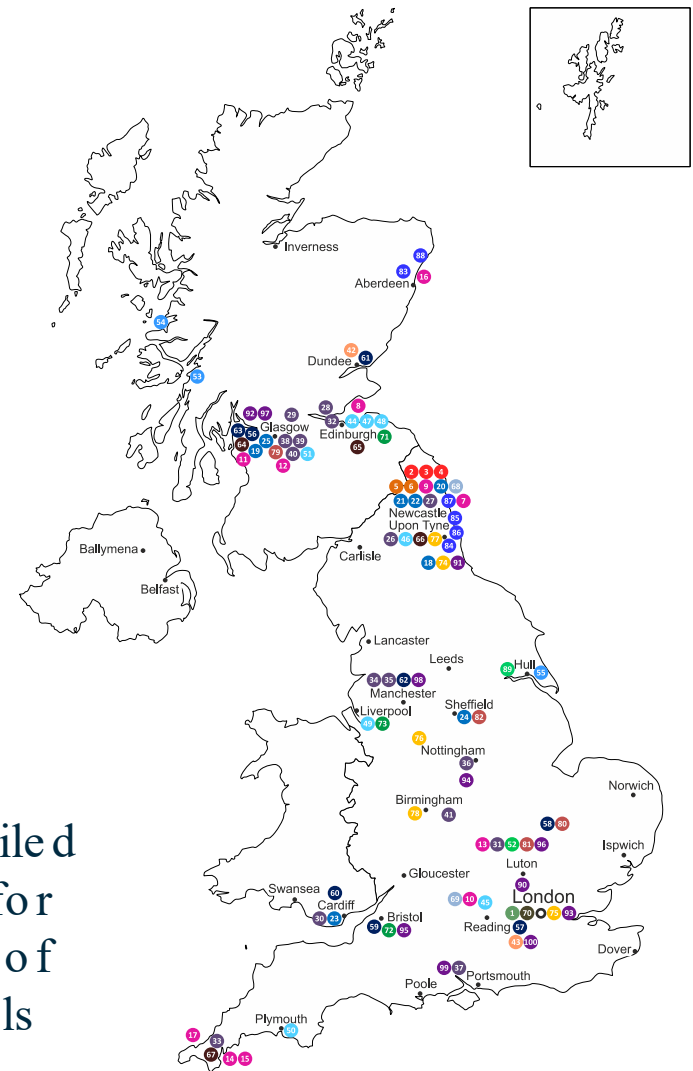
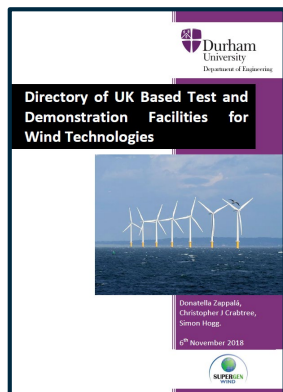


Available via
[doi.org/ 10 .15 128 /r 1ms35t864n](https://doi.org/10.15128/r1ms35t864n)

Facilities Directory

Type of Facility	
Aeroelastic Testing	Material Testing
Blade Testing	Mechanical Components Testing
Cable Testing	Meteorology
Demonstration Site	Radar
Drive Train/Dynamometer Testing	Robotics
Electrical Systems Testing	Smart Energy
Foundations	Structural Testing
Hydrodynamics	Subsea Testing
Icing Tunnel	Visualization Environment
Marine Environment	Wind Tunnels

Extensive directory with detailed information on UK facilities for testing across the full range of Technology Readiness Levels



Available via
[doi.org/ 10.15128/r1ms35t864n](https://doi.org/10.15128/r1ms35t864n)

What do we do now?

- Ørsted Chair in Renewable Energy
 - Strategic agreement between Durham and Ørsted
 - Funds a Chair and multiple MSc and PhD studentships

- EPSRC Partnership in
Offshore Wind (£7.6M)

- Universities of Sheffield, Durham and Hull
- Ørsted and Siemens-Gamesa



New Partnership
in Offshore Wind

- EPSRC/NERC AURA CDT (£5.8M)

- Universities of Hull, Durham, Newcastle and Sheffield



Durham
University

Department of Engineering

What do we do now?

- EPSRC HOME Offshore (£3M)
 - “Holistic Operation and Maintenance for Energy from Offshore Wind Farms”
 - Universities of Manchester, Durham, Strathclyde, Warwick and Heriot-Watt
 - Many industrial partners
 - European Marine Energy Centre
 - Offshore Renewable Energy Catapult
 - SP Energy Networks
 - Siemens
 - EDF
 - The Crown Estate



SUPERGEN Wind at Durham University

Thank you for listening

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