Wind Turbine Simulation, Testing and Validation

Cost-effective ways for long term predictions of drivetrains and rotor blades

01 – 02 July 2014 | Swissôtel Bremen, Germany

Chairman
Miguel Riezu Corpas, Head of Validation Rotor Blades, Gamesa Innovation & Technology, Spain

With contributions from the following companies:
- Areva Wind GmbH
- Fraunhofer Institute for Wind Energy and Energy System Technology IWES
- Energy Research Centre of the Netherlands (ECN)
- EUROS GmbH
- DEWI-OCC Offshore and Certification Centre GmbH
- Gamesa Innovation & Technology
- National Renewable Energy Center (CENER)
- ZF Wind Power
- Nordex Energy GmbH
- Deutsche WindGuard Offshore GmbH
- Center for Wind Power Drives (CWD), RWTH Aachen University, Germany
- National Renewable Energy Centre (Narec)
- Lindoe Offshore Renewables Center (LORC)
- Smart Blade, Germany
- Suzlon Energy GmbH, Germany

Best ways to gain reliable data for large-scale wind turbine designs

New tools and processes to reduce time and cost for testing

Efficient strategies to integrate simulation into testing and validate designs early on

Experience in full-scale testing to comply with certification standards

Practical examples for new turbine designs: Simulation – Testing – Prototype

Meet these experts amongst others:

Yvan Radovcic, Head of Load Engineering, Areva Wind GmbH, Germany
Lars Stylsvig Rasmussen, Project Manager LNT (Lindoe Nacelle Testing), LORC (Lindoe Offshore Renewables Center), Denmark
Dr. Romie Augustino, Wind Turbine Development Engineer, Nordex Energy GmbH, Germany
Jörg Winkelmann, Head of Innovation, Suzlon Energy GmbH, Germany
Peter Hope, Head of Blade Test Facility, Narec (National Renewable Energy Centre), UK

Interactive Workshops | Wednesday, 02 July 2014

A: Rotor blade structure and aerodynamics: challenges for simulation codes and testing

B: Experiences in validating drivetrain testing procedures

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Europe’s only networking event for test engineering
Why attend:

Presentations from international rotor blade and drivetrain experts provide challenges and approaches for long term-predictions

Get in touch with industry peers and discuss main issues and current trends in our interactive sessions

Expand your network and represent your company in a professional environment

What do participants say about our wind events?

“Once again, this was a very pleasant conference in a very relaxed atmosphere and with many networking opportunities.”
Benoit Perijean, Lead Aeroacoustics Engineer, GE Global Research

“A good chance to know more about new developments in the wind industry in a very cosy and friendly environment.”
Gian Piero Giuffré, Process Engineer, Alstom Wind

“Great overview of current and future technological trends”
Alfredo Fernandes Sison, Gamesa S.A.

Who will you meet?

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<th>Wind Turbine Manufactures</th>
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<td>Test Sites, Institutes, Wind Tunnel Operators</td>
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09:00  Registration & coffee

**Who’s who**
Learn about your peers. Discover who else is participating in the conference. The matchmaking wall will help you identify the delegates you want to meet at the conference.

09:50  Chairman’s opening
Miguel Riezu Corpas,
Head of Validation Rotor Blades,
Gamesa Innovation & Technology, Spain

**Interaction between testing and simulation**

10:00  Structural simulation validation at Areva Wind
- Practical example of gaining reliable data: global load analysis (GLA), finite element method (FE) the multi-body simulation (MBS)
- Experience in proving validity
- Development of sensors for fracture mechanics
Yvan Radovic,
Head of Load Engineering,
Areva Wind GmbH, Germany

10:30  Wind Turbine Simulation and Loads Analysis
- Simulation of (offshore) wind turbines with different tools for predicting loads and load effects
- Results of loads analysis as input for component design and testing
- Verification and validation of simulation codes for (offshore) wind turbines – experiences from the projects OC4 and OC5
Fabian Vorpahl,
Head of Department Turbine Simulation, Software Development and Aerodynamic,
Fraunhofer Institute for Wind Energy and Energy System Technology IWES, Germany

11:00  Refreshment break & networking

11:30  Modular models to ensure design for reliability
- Approaches in defining the details and models needed for the pitch system
- Approaches in designing controller for reliability
- Introduction to Protest and Design for Reliability
Dr. Wouter Engels,
Researcher Wind Energy Technology Group,
Energy research Centre of the Netherlands ECN, The Netherlands

12:00  Speed networking
Meet your industry peers in this series of quick-paced 1-1 meetings – make sure you bring a stack of business cards!

12:30  Networking lunchon

**Fatigue test strategies**

14:00  Design of fatigue tests for large-scale blades
- New challenges for loads on large-scale rotor blades
- New approaches for dynamic tests
- Potential solutions for realistic loads
Stefan Löser,
Head of Design & Analysis,
EUROS GmbH, Germany

14:30  Fatigue life of WTG rotor shafts in theory, practice and in a full scale testing environment
- Common assessment of the fatigue life of a WTG rotor shaft and different wear mechanisms
- Influences on the test strategy for a full scale fatigue test
- Difficulties and limits of HALT approaches
Jörg Winkelmann,
Head of Innovation,
Suzlon Energy GmbH, Germany

15:00  Extreme and fatigue loads in blades with three different lengths: Impact of different parameters and of the two and three bladed concepts on the blade loads
- 2- and 3-bladed rotors fatigue and extreme loading in blade sections
- Up scaling of blades: Three multi-megawatt blades with different lengths comparison of the loads in different sections
- Proportion of external loads due to inertia-mass acceleration of the blade sections and by means of aerodynamic loading
Lain Nieto Gómez,
Load Assumptions,
DEWI-OCC Offshore and Certification Centre GmbH

15:30  Refreshment break & networking

16:00  Subcomponent testing as part of the validation & certification strategy for rotor blades
- The building-block approach in connection to rotor blade validation
- Introduction and development of subcomponent tests for rotor blades
- International standards: current status and future trends with regards to subcomponent tests
Miguel Riezu Corpas,
Head of Validation Rotor Blades,
Gamesa Innovation & Technology, Spain

16:30  Challenges for testing and simulation of drivetrains and blades
- Experiences in drive train testing
- New approaches for testing and simulation
- Testing of large blades
Gurutz Urzelai,
Head Of Wind Turbines Testing Labs,
National Renewable Energy Center (CENER), Spain

17:00  Panel discussion
Need for standardization?
Our expert speakers will share experience with new standards, certifications and their test requirements for drivetrains and rotor blades

17:30  Closing remarks of the chairman

18:30  Casual evening reception
Join us for an informal evening get-together at the Pannekoken Ship, where we will be served by a pirate crew. This is an excellent opportunity for you to follow up on the discussions of the day and make new business contacts.
**Breakfast Workshop A | 08:00 – 09:30**

**Rotor blade structure and aerodynamics: challenges for simulation codes and testing**

The growing size of blades and the constant need for cost reduction is a powerful driver for innovative tools which allow reliable long term predictions.

- Airfoil simulation & Wind Tunnel Testing: Standard practice and future developments
- Full rotor CFD & Field Aerodynamic Testing
- Developments in the fidelity of aeroelastic codes
- Sectional vs 3D FEA structural simulations
- Full turbine FSI (Fluid Structure Interaction) through CFD and FEA: Dream or Reality
- Parallelization, GPU computing and Cloud Computing Developments

The aim of the workshop is to bring all relevant stakeholders together to brainstorm major challenges and approaches.

Georgios Pechlivangolou,
Technical Director,
Smart Blade GmbH, Germany

**Sophisticated testing systems**

10:00 **Philosophy of testing – new methodologies to improve testing and define technology gaps**

- Assumptions for long term predictions for wind turbines
- New strategies behind testing
- Technology gaps in current testing – defining the room for improvement for future projects

Dr. Joris Peeters,
Manager Structural Components & Testing,
ZF Wind Power, Belgium

10:30 **Round tables on main challenges for testing**

Join one of five discussions on the most relevant topics generated in our live poll session in the morning

11:00 **Refreshment break & networking**

**Innovative tools to reduce time and costs of testing**

11:30 **New approach in testing rotor blades: Bi-axial testing strategy**

- Challenges of simultaneous application of flap and lead-lag loads
- Introduction and development of new test tools for rotor blades
- First results of research projects

Falko Bürkner,
Head of Department Testing Laboratories,
Fraunhofer Institute for Wind Energy and Energy System Technology IWES, Germany

12:00 **Drivetrain simulation: Optimization through flexible-multi-body simulation**

- Advantages of flexible multi-body-simulation
- Methodology for integrating flexible components into multi-body-simulation
- System-level design validation and optimization

Dr. Romie Augustino,
Development Engineer Wind Turbine and Drivetrain,
Nordex Energy GmbH, Germany

12:30 **Wind tunnel testing – approaches to shorten the test procedure by integrating aeroacoustic data**

- Development of new test procedures to generate realistic aeroacoustic data
- Validation of acoustic tests
- Challenge to create realistic conditions

Nicholas Balarasques, Manager Wind Tunnel Tests,
Deutsche WindGuard Engineering GmbH, Germany

13:00 Networking luncheon

**Building new test benches**

14:30 **RWTH Aachen: Development of onshore system test rigs**

- Planning and construction of a 4 MW WT system test rig
- Experience in testing a 850 kW nacelle at the 1 MW test rig
- Rotor & Grid real time simulation for Hardware in the Loop testing

Dennis Bosse,
Head of Testing, Center for Wind Power Drives (CWD), RWTH Aachen University, Germany

15:00 **Challenges in designing and building a large blade test facility**

- Overcoming the engineering challenges
- New technologies required
- Software modelling and development

Peter Hope,
Head of Blade Test Facility,
National Renewable Energy Centre (Narec), UK

15:30 **LORC Nacelle Testing: two test-dock design**

- Realistic functionality testing of complete nacelles
- Business case example on frequency response testing
- Reliability testing through excessive loading testing

Lars Stylishv Rasmussen,
Project Manager Lindoe Nacelle Testing,
Lindoe Offshore Renewables Center (LORC), Denmark

16:00 **Chairman’s closing remarks**

and farewell coffee

**Evening Workshop B | 16:30 – 18:30**

**Experiences in validating drivetrain testing procedures**

Along with the constant growth of turbine size and new innovative turbine concepts comes a need for efficient validation and prediction of field behaviour. The last years have witnessed a very fast paced construction of new test benches for drivetrains and the simulation of operating conditions in highly accelerated test rig tests. Main topics of the workshop are:

- Goals and requests for representative validation, correlation between simulation, test rig tests and field validation
- Efficient tools and methods for test and validation, from component test to field validation in the turbine
- Whole system approach, highly accelerated tests and drive train tests
- Advantages of Component tests

The workshop will follow up on the discussions on the conference days and allow manufacturers, test sites, institutes and certifiers to share their experience.

David Borrell,
Head of Drivetrain,
Suzlon Energy GmbH, Germany
International Conference

Wind Turbine Simulation, Testing and Validation

01 – 02 July 2014 | Swissôtel Bremen, Germany

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Conference Packages

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<td>Gold Package</td>
<td>Save € 300,-</td>
<td>€ 3.349,- + VAT</td>
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<tr>
<td>Silver Package</td>
<td>Save € 200,-</td>
<td>€ 2.849,- + VAT</td>
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<tr>
<td>Bronze Package</td>
<td>Save € 100,-</td>
<td>€ 2.549,- + VAT</td>
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Please indicate your choice of workshop on Wednesday, 02 July 2014

A: Rotor blade structure and aerodynamics: challenges for simulation codes and testing
B: Experiences in validating drivetrain testing procedures

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