

5th International Conference

Advances in Rotor Blades for Wind Turbines

Improved design, production and materials to maximise power at minimum cost

19 – 21 April 2016 | Swissôtel Bremen, Germany

Join this focused knowledge exchange and:

- Discuss alternative materials, **composites** and new **material mixes** to decrease weight and costs
- Review **XXL blades** and related challenges for advances in design and reliable production
- Explore efficient ways to optimise your **structural design and aerodynamics** to increase blade performance
- Get the **operators' view** on blade damages and discuss related consequences for design, materials and reliability
- Learn about new **low wind speed blades** to handle challenges for **load control, tip speed** and **aero-elastic**

Learn from these experts amongst others:

Chairmen:



Alessio D'Alesio,
Head of V 126 Blade
Development, **Vestas
Blades UK Ltd.**, UK



Sandra Arroz Collado,
Blade Structural Integrity
Expert, 5MW & 3.3MW
Blades Stress Team Leader,
Gamesa Wind Power, Spain



Peder Enevoldsen,
Chief Engineer,
Siemens Wind Power,
Denmark



Dr. Klaus Kaiser,
Team Leader Functional
Loads 8 MW, **Adwen
GmbH**, Germany



Mark Hancock,
Engineering Specialist,
GE Wind Power,
UK



David Heredero Olayo,
CTO,
TECSIS,
Brazil



Dr. Sascha D. Erbslöh,
Team Leader Aero-
dynamics, **Senvion
GmbH**, Germany



Alexander Krimmer,
Team Leader Blade Material,
EUROS, Germany



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Catching the winds of Tomorrow

Interactive Workshop Day | Thursday, 21 April 2016

A | Latest research on fatigue

B | Blade to turbine connection - related challenges and possible cost savings

C | Advanced materials for reliable lightweight design

Advances in Rotor Blades for Wind Turbines



19 – 21 April 2016 | Swissôtel Bremen, Germany

What do participants say about our wind events?

"A good forum for networking. High standard of papers. Excellent place to get connected to the industry in a few days."

Mark Hancock, **GE Wind Power**

"Inspiring and hands on real blade challenges."

Francesco Grasso, **Vestas Blades Ltd.**

"Great venue with a familiar atmosphere. High quality presentations. Excellent networking opportunities."

Daniel Vogt, **Sika Services AG**

"It was a very informative and good organized conference"

Alexander Krimmer, **Euros GmbH**

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LAP is world leader in laser projection systems. An important application is manufacturing of high-tech parts in the production of rotor blades for wind-energy plants as well as in the aerospace and automotive industries. The projection of contours supports high efficiency and quality within production processes and quality assurance tasks.



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Advances in Rotor Blades for Wind Turbines



Conference Day 1 | Tuesday, 19 April 2016

09:00 Registration and welcome coffee



Who is Who

Discover who else is participating in the conference. The matchmaking picture wall will help you identify who you want to meet at the conference. In cooperation with **FUJIFILM**

09:50 Opening by
Alessio D'Alesio,
Head of V 126 Blade Development,
Vestas Blades UK Ltd., UK



Where are we going? – Latest market trends and aspects in certification

Joined session with co-located conference Wind Turbine Rotor Blade O&M

10:00 **Market forecasts for on- and offshore wind rotor blades - past, status quo and future of politics, markets, and systems**

- Depicting political, geographical and economical framework conditions
- Forecasting market developments
- Analysing wind farms based on the cockpit database



Dirk Briese, CEO, **wind:research**, Germany

10:30 **New aspects in certification to cover the entire life cycle of wind turbine rotor blades**

- A more holistic approach for a rotor blade standard
- Everything from scratch to end of blade life taken into account
- Stronger focus on proper blade production process
- More attention to in-operation phase of rotor blades



Johannes Leib, Technical Manager, **DNV GL**, Germany

11:00 **Speed Networking**



Meet your industry peers in this series of quick-paced 1-1 meetings – make sure you bring a stack of business cards

11:45 Refreshment break and networking

Progress in optimum blade design

12:15 **Low wind speed rotor blade design for the new Servion EBC Platform**

- Introduction of the Servion EBC Platform
- Blade design for the new 140m rotor
- Ecological and control features



Dr. Sascha D. Erbslöh, Team Leader Aerodynamics,
Servion GmbH, Germany

12:45 **Aero-elastic of long rotor blades**

- Design trends
- Limits of tools for prediction
- Verification with simulations and measurements



Dr. Klaus Kaiser, Team Leader Functional Loads 8 MW,
Adwen GmbH, Germany

13:15 Networking luncheon

14:45 **Triblade – a disruptive technology for stronger, longer and lighter rotor blades**

- 3D truss design
- Advances for weight and structural properties
- First test results



Rikard Berthilsson, CEO, **Winfoor AB**, Sweden

15:15 **Gamesa XL Blades Design and Validation challenges**

- Improved blades design and validation strategies
- Fatigue of composite laminates. Failure modes related (IFF, fiber volume fraction,...)
- Fatigue of adhesive joints. Trailing Edge and cap-web joints



Sandra Arroz Collado, Blade Structural Integrity Expert,
5MW & 3.3MW Blades Stress Team Leader, **Gamesa Wind Power**, Spain

15:45 Refreshment break and networking

16:15 **Development towards rotor blades with combined passive and distributed active load control**

- Challenges, barriers and perspectives for further upscaling of rotors from 8 towards 20 MW
- High tip speed aerodynamic concepts and two-bladed concepts.
- Long slender and flexible blades with thick airfoils
- Aeroelastic tailoring, stability and passive and active load control and alleviation
- Advanced CFD-structure simulations



Flemming Rasmussen, Head of Aeroelastic Design Section, **DTU Wind Energy**, Denmark

16:45 **Latest developments of the open source wind turbine design and simulation software QBlade of HFITU Berlin**

- Short presentation of QBlade history
- Advanced aerodynamic simulations with Lifting Line - Free Vortex Wake (LLFVW) model
- Implementation of new unsteady aerodynamics model
- Coupling of LLFVW module with NREL/NWTC FAST structural model
- Implementation of multi-threading and GPU computing capabilities
- On-board turbulent inflow field generator
- A glance at the future developments of QBlade



Matthew Lennie, Research Fellow,
Technical University Berlin, Germany

17:15 Closing remarks by Alessio D'Alesio and end of conference day 1

18:00 **Evening event**




Join us for an informal evening get-together at the restaurant Schüttinger Brauhaus! This is an excellent opportunity for you to meet the other attendees and make new business contacts.

Advances in Rotor Blades for Wind Turbines



Conference Day 2 | Wednesday, 20 April 2016

08:30 Registration and welcome coffee


08:50 Opening by
 Mark Hancock,
Engineering Specialist,
GE Wind Power, UK

Advances in manufacturing to increase blade quality

09:00 **New advances in blade root technology - A case study across 2-5 MW platform**
 Dr. Lennart Kühlmeier, Head of Blade Design,
SSP TECHNOLOGY, Denmark


09:30 **TECSIS roadmap to reduce blade costs & improve quality**

- NPI as a key driver to overcome future problems
- How to reduce costs during blade development
- Design for Manufacturing solutions
- Time to market for shorter blade lifetime cycles


 David Heredero Olayo, CTO, **TECSIS**, Brazil

10:00 **How to overcome large wind turbine blade challenges**

- Challenges in design of large blades
- Importance of test and validation work
- Discussion on manufacturing methods, material selection and aerodynamic design

 Peder Enevoldsen, Chief Engineer,
Siemens Wind Power, Denmark

Advances in materials to improve reliability and cost function

10:30 **Advances in materials & systems for wind turbine rotor blades**
 **BASF** Coatings GmbH, Germany

11:00 Refreshment break and networking


11:30 **Potentials for functional coatings on rotor blades**

- Progress in the field of functional coatings
- Recent developments
- Potentials and challenges for application on rotor blades

 Nadine Rehfeld, Project Lead Anti-ice,
Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM, Germany


12:00 **Capabilities of composite materials under fatigue loading**

- Why is fibre fracture not driving the XL blade design
- Effects of matrix damage on composite failure
- Impact of waves on fatigue life


 Alexander Krimmer, Team Leader Blade Material,
EUROS Entwicklungsgesellschaft für Windkraftanlagen mbH, Germany


12:30 **Fatigue performance of composite materials, adhesives and coatings for wind turbine blades**


- Fatigue of composite laminates: Influence of fiber volume fraction
- Fatigue of adhesives: Comparison between coupon and blade tests
- Coatings performance under rain erosion: experimental results of the new test stand

 Dr. Alexandros Antoniou, Senior Scientist Structural Components, **Fraunhofer Institute for Wind Energy and Energy System Technology IWES**, Germany

13:00 **Round tables session**
 Join one of our round table discussion on different aspects of rotor blade design, production and materials

Round table A:
Challenges in developing XL rotor blades
 Stefan Löser, Head of Design & Analysis,
EUROS Entwicklungsgesellschaft für Windkraftanlagen mbH, Germany

Round table B:
Reviewing manufacturing – one shot technology vs. conventional
 Arnold Timmer, General Manager and Manager Materials and QA/QC, **We4Ce-TRES4**, The Netherlands

Round table C:
Lightweight materials for next generation rotor blades
 Ashish Pawar, Advanced Design Engineer,
Siemens Wind Power, Denmark

Round tables recap: Participants return to the main plenary room to hear the discussion leaders summarizing the main topics and conclusions of their round tables.

13:45 Networking luncheon

Operators view on typical blade failure and potential to increase performance

Joined session with co-located conference Wind Turbine Rotor Blade O&M


15:15 **Repair and rejuvenate – Innovative solutions for fast and reliable blade repairs**


- On-site structural and cosmetic repair of rotor blades
- Minimising downtime by easy-to-handle and fast curing products
- Repairing back to OEM standards

 Daniel Vogt, Business Development Manager Industry,
Wind Energy EMEA, **Sika Europe Management AG**, Switzerland

15:45 **Latest advancement on leading edge protection for rotor blades**

- Erosion phenomenon
- Leading edge protection
- Test campaign
- Reducing the Cost of Energy

 Gian-Piero Giuffre, Materials Engineer,
GE Wind Power, Spain

16:15 **Panel discussion on cost optimisation, CAPEX vs. OPEX**
 How can we cut down costs? Which areas have the highest potential for cost optimisation? Where do you see main cost drivers and room for development? Which are the future trends, in which direction is the market developing?

16:45 Closing remarks by Mark Hancock and end of conference.

Advances in Rotor Blades for Wind Turbines



Workshop Day | Thursday, 21 April 2016

08:30 Registration & coffee

10:30 Refreshment break & networking

Workshop A | 09:00 – 12:00 Latest research on fatigue

New generation of **long and slender** blades will deal with significant challenges in fatigue design and **verification**. Which fatigue failure modes will drive the design of future blades? Is any **limit foreseen** in fatigue sizing with the current state of the art of blade structures?

- Influence of fatigue verification on blade sizing
- Fibre / interfibre / adhesive joints fatigue analyses approach
- Challenges in full-scale tests for new generation of blades



Ion Arocena de la Rúa,
Project Manager,
Nabrawind, Spain

Workshop B | 09:00 – 12:00 Blade to turbine connection - related challenges and possible cost savings

From time to time, wind turbines are equipped with longer blades for a given generator power setting or wind turbine platform. This is to maximize power output, increase capacity factor, and optimize the costs of energy for the applicable wind site. Within a wind turbine platform, between the different rotor diameters it is the goal to minimize a change of turbine components such as hub and pitch bearing. Latter components are a.o. being influenced in size by the load capacity of the blade root. The load capacity of the **blade root** is driven by the pitch circle diameter, the number of bolts, and the load capacity of one bolt segment. If the **load capacity** and **reliability** of one **bolt segment** is high, the pitch circle diameter and number of bolts is limited and vice versa. If the **pitch circle diameter** is limited, **hub geometry** and **pitch bearing** can be limited leading to **lower overall costs**. In this workshop a group-discussion will be set up on the following topics and questions:

- The **common types** of blade to turbine connections
- Pros and cons of different solutions with focus on manufacturing
- An **O&M perspective**: feedback asked from the park-operators or maintenance and service companies
- A turbine **manufacturer's perspective**: where are the limits for the turbine designers if the **blade root design** is not design driven?
- Potential **alternatives**
- **Cost** aspects

Goal of the workshop is to create a "blade to turbine connection" specification in which the feedback received from the different market disciplines are being combined.



Edo Kuipers, CTO,
Arnold Timmer, General Manager and Manager Materials and QA/QC,
We4Ce-TRES4, The Netherlands

12:00 Networking luncheon

14:30 Refreshment break & networking

Workshop C | 13:00 – 16:00 Advanced materials for reliable lightweight design

Materials are the biggest cost factor, accounting for 60 % of the total costs for rotor blade production. This workshop aims to discuss different approaches to handle **CAPEX** for increasing **blade length**.

- Glass fibre vs carbon fibre – pros, cons and combinations
- Carbon-fibre-reinforced plastics
- Potential solutions to decrease weight



Alexander Krimmer,
Team Leader Blade Materia,
EUROS Entwicklungsgesellschaft für Windkraftanlagen mbH, Germany

16:00 End of interactive workshop day

Advances in Rotor Blades for Wind Turbines

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Co-located with the
2nd International Conference
Wind Turbine Rotor Blade O&M

4 Ways to Register

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Post: IQPC Gesellschaft für

Management Konferenzen mbH

Friedrichstraße 94

10117 Berlin, Germany

Online: www.wind-rotor-blades.com/MMEmail: eq@iqpc.de

For further information

Phone: +49 (0)30 20 91 33 88

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Conference Packages	Standard Price
<input type="checkbox"/> Gold Package 2 day conference plus 2 workshops	€ 3.649,- + VAT
<input type="checkbox"/> Silver Package 2 day conference plus 1 workshop	€ 3.249,- + VAT
<input type="checkbox"/> Bronze Package 2 day conference	€ 2.849,- + VAT

Please indicate your choice of workshop on Thursday 21 April 2016

Workshop A | Workshop B | Workshop C

A | Latest research on fatigue

B | Blade to turbine connection - related challenges and possible cost savings

C | Advanced materials for reliable lightweight design

Only one discount applicable per person.

 CAN'T MAKE IT TO THE CONFERENCE? PURCHASE THE 2-DAY DOCUMENTATION FOR € 990,- +VAT.
Documentation will be sent 6 weeks after the event

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