

PORTFOLIO

Services & Products



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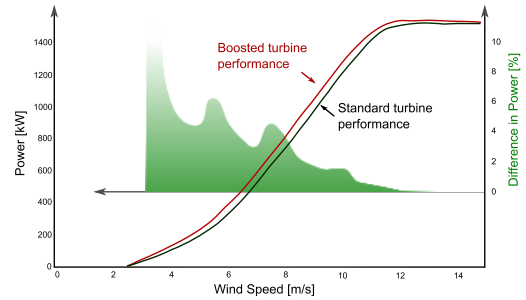
WIND TURBINE AERODYNAMICS & BLADE DESIGN



BLADE MAINTENANCE AND OPTIMIZATION

Through our experience in wind turbine aerodynamics, the knowledge of our structural experts and our field service partners all over the world, we can offer you a full range of wind turbine rotor blade inspection, maintenance and repair services:

- > Visual and NTD blade inspection
- > Damage assessment and management
- > Aerodynamic performance optimization

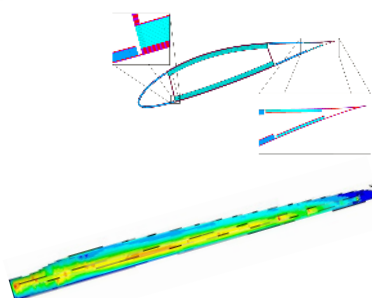
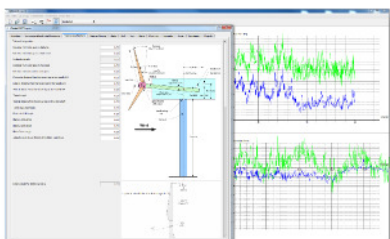
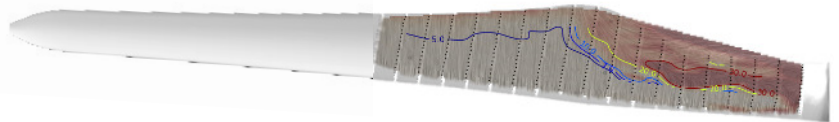
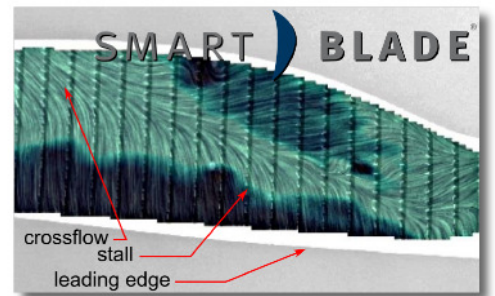


Our Performance Boost Packages include proposals and custom feasibility analysis studies for the performance boosting potential of various wind turbine types. Our solutions include mainly Vortex Generators. These devices help to overcome aerodynamic induced degradations in performance over the years and are a cost efficient and effective solution to boost the turbine performance to nominal level or even beyond. Together with our partners we have successfully performed the installation of VGs on almost 200 wind turbines with a zero-failure record.

SMARTviz

Wind turbine aerodynamics are very complex and unsteady. The large size of the structures and their inherent flow complexity makes aerodynamic time-accurate simulation of rotor blades a slow and cost-intensive process. In order to achieve a reliable, cost effective and versatile flow analysis technology, SMART BLADE in collaboration with HFI TU Berlin developed the SMARTviz. This innovative flow visualization technique combines the traditional flow-tuft analysis with modern High Resolution image capture and processing technologies.

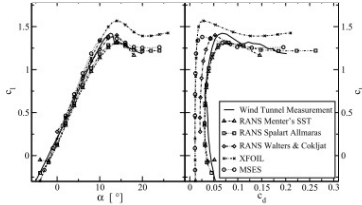
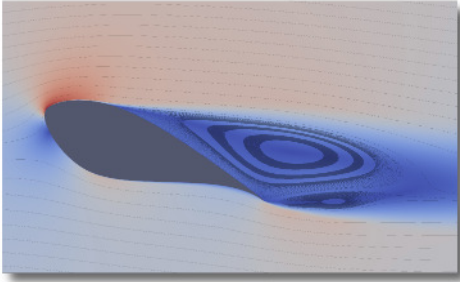
The result of SMARTviz is a high fidelity, cost effective flow analysis method able to provide spatial and temporal flow data for the actual turbine blades in the field!



BLADE DESIGN

- We currently offer wind turbine blade design according to IEC 61400. Together with our technology experts we carry out all tasks, from the initial concept up to the prototype manufacturing and series production. Our scope includes:
- > Aerodynamic design
 - > Structural design
 - > Aeroelastic load calculations
 - > Mold design
 - > Production process planning

AIRFOIL DESIGN & PERFORMANCE ANALYSIS



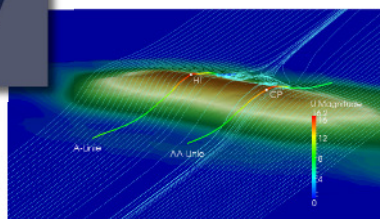
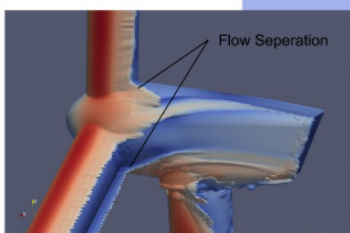
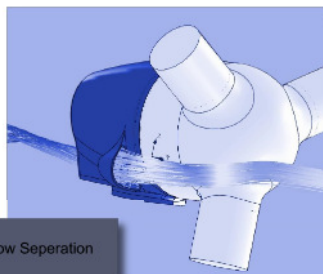
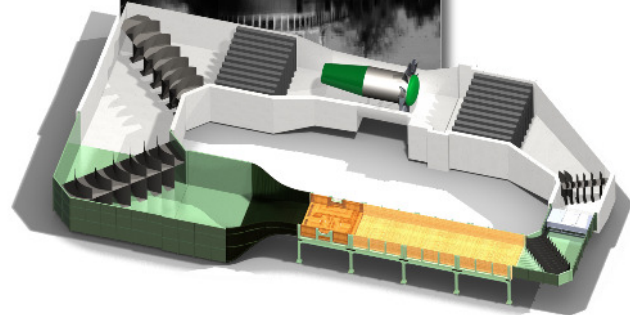
> Experience shows how important the correct modeling of the blade airfoil characteristics is. All the engineering models used for the blade design rely on accurate representation of the airfoil behavior. We therefore offer sophisticated airfoil analysis and performance simulation services.

- > Performance simulation using advanced CFD simulation codes of various fidelity levels (OpenFOAM, Fluent, CFX, MSES, XFOIL)
- > Full wind tunnel validation campaigns
- > Airfoil shape optimization
- > Static and dynamic wind tunnel measurements
- > Advanced wind tunnel flow visualization techniques
- > Passive and Active Flow control solution integration

MEASUREMENT CAMPAIGNS

> Using the wind tunnel facilities of the Institute of Fluid Dynamics and Technical Acoustics of the Berlin Institute of Technology (HFI TU Berlin), we can provide custom wind tunnel / water tunnel measurements for wind turbine airfoils, nacelles and cooling systems. With our strong scientific and research background we can help you plan, perform and evaluate successful experimental campaigns.

- > Measurements at a large wind tunnel (1.44m x 2m) using pressure and/or force sensors.
- > Design and manufacturing of wind tunnel models
- > Data acquisition and post-processing
- > Flow visualization SMARTviz, mono & stereo PIV and LIV methods
- > Water tunnel facilities for high Reynolds Number measurements
- > Unique testing opportunities at the 2nd largest water towing tank in Europe



TECHNICAL CONSULTING

> Apart from our specific product and technology development services we also provide Technical Consulting to wind park planners, wind turbine operators, manufacturers and more.

Some of our consulting services are:

- > Blade Technical Document Review
- > In Situ Blade Manufacturing Analysis
- > In Situ Blade Inspection (pre or post installation)
- > Custom Repair Case Development
- > Rotorblade Reverse Design and Simulation
- > Mesoscale CFD Analysis for Complex Terrains
- > Nacelle and Cooling System CFD analysis

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