DeepWind Deliverable

Grant Agreement number: 256769

Project title: Future Deep Sea Wind Turbine Technologies

Deliverable No.: D9.1

Deliverable title: Website, publications and conference presentations

Deliverable status: draft

Name of lead beneficiary: DTU

Nature of deliverable: R

Dissemination level: PU

Due date from Annex 1: M45

Actual submission date: M48

Quality check approval by: date: 15-9-2014

Website, publications and conference presentations

Within the project a number of scientific contributions to the work packages have been accomplished. An overview is given below in Figure 1 on the work package, and on the contributions, in Figure 3.

Timeline:

The website www.deepwind.eu was established 1 Month after project start, and contributions were made due to inputs provided to the news press at DTU Risø, local newspapers (technical and non-technical), Danish National Radio Broadcast(2) and TV programs(1), interviews in various Technical Magazines, invited speeches on virtual portal and conferences and establishing networking with colleagues and organizations within the wind energy business. Also Deutschlandfunk broadcasted an interview with coordinator from the 2014 Wind Energy meeting in Barcelona(Spain) The web administration was with DTU, and was in its design not suited to provide direct web input by consortium members. A newly constructed web service(April 2014) has these facilities and can allow 3 members to participate. AAU has volunteered as the only member to directly place information on the server(still though administrated at DTU). Updating of the publications, movies and contributions for dissemination are worked on also after project end.

Connection to other deliveries:

The dissemination activities have been reported as per 6 month in consortium management reports, D10.1-D10.8. The nature of this information is restricted for the consortium and the commission.

Verification of scientific dissemination channels with published entries:

An overview of the potential journals we wanted to reach within the project scope is listed below in Figure 2, and the figure shows that 6 contributions out of 15 are satisfied. Other contributions are not listed, such as materials science and magnetic technologies magazines.

WP Number [63]	WP Title	Type of activity [64]
WP 1	Aero-elastic code and simulation of performance, dynamics and loads	RTD
WP 2	Blade technology and blade design	RTD
WP 3	Generator concepts	RTD
WP 4	Turbine operational control	RTD
WP 5	Mooring, floating and torque absorption systems	RTD
WP 6	Exploration of torque, lift and drag on a rotating tube	RTD
WP 7	Proof-of-principle experiments	RTD
WP 8	Integration of technologies and upscaling	RTD
WP 9	Dissemination and Exploitation	OTHER
WP 10	Management	MGT

Figure 1 Work Package description, from DeepWind DOW

- The Journal of Fluid Mechanics
- Journal of Fluids and Structures
- Ocean Engineering
- International Journal of Structural Stability and Dynamics (IJSSD)
- International Journal of Offshore and Polar Engineering (IJOPE,ISOPE)
- Journal of Offshore Mechanics and Arctic Engineering(ASME,OOAE,OMAE)
- Applied Physics Letters
- Journal of Magnetism and Magnetic Materials
- Physical Review Letters
- Sensors and Actuators
- Wind Energy (Wiley InterScience)
- Journal of Composite Materials
- American Institute of Aeronautics and Astronautics (AIAA)

- IEEE Press
- *European Wind Energy Conference* EWEC

Figure 2 Scientific dissemination channels

Selected Contributions

WORK PACKAGE	MAIN RESULT	EXPLANATION	CONTRIBUTION TO COME	IMPACT
WP1,2,3	Design tool	How the design tool works -Concept -Power generator and conversion	Commercial product?	-Capitalized knowledge, experience and competence -Design tool for industry
WP 4	Conference presentations & paper	Aerodynamic model, 9th Deep Sea Offshore Wind R&D Conference, Jan 2012		- Capitalized knowledge, experience and competence
		Variable speed control, EWEA 2012 Scientific track, Apr 2012		- Capitalized knowledge, experience and competence
		Start/stop control, 10th Deep Sea Offshore Wind R&D Conference, Jan 2013		- Capitalized knowledge, experience and competence
	Journal publication		Baseline controller	- Capitalized knowledge, experience and competence
WP 5	Initial design	Dissemination of results		Publicity, sharing results
WP1-6	Journal publication	Design of 5 MW offshore concept OMAE 2012	Design optimization on a 5 MW floating VAWT	- Capitalized knowledge, experience and competence
	Conference presentations	Explanation of novel concept EWEA2012 Scientific track, April 2012		- Capitalized knowledge, experience and competence
WP7	Exploration of concept (demo)	Concept Testing of a Simple Floating Offshore Vertical Axis Wind Turbine	Measurement analysis report, YouTube link	Scientific dissemination
WP9	Web site	Channel for public info	You Tube links, updates	Internet broadcast, dissemination channel
WP1-6	Exploration of concept	PHD work in Offshore floating vertical axis wind turbines with rotating platform, Risø-PhD-80(EN) DTU 2011	**Peered article on the integrated concept**	Scientific dissemination

Figure 3 Overview of dissemination activities within work packages, as shown at the midterm review meeting

List of publications within the project:

Within Aero-elastic code and simulation of performance, dynamics and loads:

Luca Vita “Offshore Floating Vertical Axis Wind Turbines with rotating platform”. Risø-PhD-80(EN) August 2011.
Helge Aagaard Madsen ”The Actuator Cylinder – A Flow Model for Vertical Axis Wind Turbines”. Aalborg University Centre, January 1982.
HAa Madsen, US Paulsen L Vitae (2012), Analysis of VAWT aerodynamics and design using the Actuator Cylinder flow model, Paper presented at the conference, The Science of Making Torque from Wind October 9-11, 2012. Oldenburg (Oldb), Germany
HAa Madsen, TJ Larsen, US Paulsen, L Vita, (2013), Implementation of the Actuator Cylinder flow model in HAWC2 for aeroelastic simulations on Vertical Axis Wind Turbines. Paper AIAA 2013-0913 presented at 51st AIAA Aerospace Sciences Meeting including the New Horizons Forum and Aerospace Exposition 07 - 10 January 2013, Grapevine (Dallas/Ft. Worth Region), Texas
TJ Larsen, HAa Madsen (2013), On the Way to Reliable Aeroelastic Load Simulation on VAWT´s. Paper in Proceedings of EWEA 2013, European Wind Energy Conference & Exhibition, February 4-7, Vienna.
Carstensen S., Mandviwalla X.,Vita, L., Paulsen U.S., “Lift of rotating circular cylinder in unsteady flows”, paper accepted for the proceedings of the The 22nd International Ocean and Polar Engineering Conference, ISOPE 2012, Rhodes, Greece.
Ferreira CS, Madsen HAa, Barone M, Roscher B, Deglaire P and Arduin I, “Comparison of aerodynamic models for Vertical Axis Wind Turbines”. Paper presented at the Torque 2014 conference in June at DTU, Denmark
Paulsen US , Vita L, Madsen HA, Hattel J, Ritchie E, Leban KM, Berthelsen PA, Carstensen S 1st DeepWind 5 MW baseline U.S Paulsen/ Energy Procedia 00 (2013) 000–000 11 design. Energy Procedia 00 (2011) 000–000

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Berthelsen, PA, Fylling I, Vita L, Paulsen US Conceptual Design Of A Floating Support Structure And Mooring System For A Vertical Axis Wind Turbine Proceedings of the ASME 2012 International Conference on Ocean, Offshore and Arctic Engineering OMAE 2012, Rio de Janeiro, Brazil
US Paulsen, HAa Madsen, JH Hattel, I Baranc, PH Nielsen, (2013), Design Optimization of a 5MW Floating Offshore Vertical-Axis Wind Turbine. DeepWind'2013, 24-25 January, Trondheim, Norway
David R.S. Verelst, Helge Aagaard Madsen, and Knud A. Kragh August 2014, Detailed Load Analysis of the baseline 5MW DeepWind Concept, DTU Wind Energy Report-XXX

Within Blade technology and blade design:

Schmidt Paulsen, Uwe (Author); Aagaard Madsen , Helge (Author); Nielsen, Per Hørlyk (Author); Kragh, Knud Abildgaard (Author); Baran, Ismet (Author); Hattel, Jesper Henri (Author); Ritchie, Ewen (Author); Leban, Krisztina (Author); Svenden, Harald (Author); Berthelsen, Petter A. (Author) / DeepWind. From idea to 5 MW concept.
2014. EERA DeepWind 2014 - 11th Deep Sea Offshore Wind R&D Conference, Trondheim, Norway, 22/01/14.
Publication: Research - peer-review › Sound/Visual production (digital) – Annual report year: 2014
Baran, Ismet; Hattel, Jesper Henri; Akkerman, Remko / Investigation of process induced residual stresses and deformations for industrially pultruded parts having UD and CFM layers.
Proceedings - 12th World Pultrusion Conference. 2014.
Publication: Research - peer-review › Conference abstract in proceedings – Annual report year: 2014
Baran, Ismet; Hattel, Jesper Henri; Akkerman, Remko / Investigation of the spring-in of a pultruded L-shaped profile for various processing conditions and thicknesses.
In: Key Engineering Materials, Vol. 611-612, 2014, p. 273-279.
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Baran, Ismet; Carlone, Pierpaolo ; Hattel, Jesper Henri; Palazzo, Gaetano S. ; Akkerman, Remko / The Effect of Product Size on the Pulling Force in Pultrusion.
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Carlone, P.; Baran, Ismet; Hattel, Jesper Henri; Palazzo, G.S. / Computational Approaches for Modeling the Multiphysics in Pultrusion Process.
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Schmidt Paulsen, Uwe; Aagaard Madsen , Helge; Hattel, Jesper Henri; Baran, Ismet; Nielsen, Per Hørlyk / Design Optimization of a 5 MW Floating Offshore Vertical-axis Wind Turbine.
In: Energy Procedia, Vol. 35, 2013, p. 22-32.
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Baran, Ismet; Tutum, Cem Celal; Hattel, Jesper Henri / Evaluation of the process induced residual stresses at the web-flange junctions of pultruded GFRP profiles.
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Synergy aspects with other institutions: workshop at Sandia National Laboratories, Wind Energy Technologies Department(US), for the VAWT Project Kickoff Meeting March 6-7, 2012(blade Pultrusion industry present)

(Invitation to the North America Offshore Wind Development & Finance Summit 2011, Washington on DeepWind’s contribution to the subject “the floating offshore wind technologies” Uwe Schmidt Paulsen DeepWind- tomorrow’s concept for large offshore wind power)

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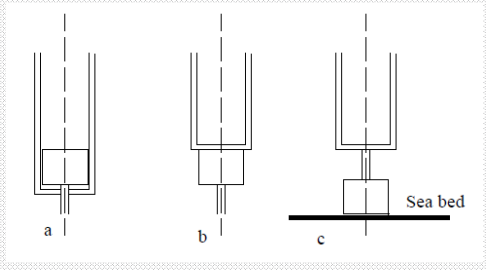
Presentation of a small model is made for conferences and for demonstration to the public, sees Figure 4.

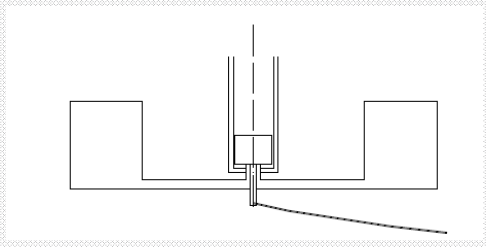
An example of a description for engineers to connect with DeeepWind is also shown.

Figure 4 Conference, Workshop and demonstration model, presented first time EWEA 2012 Copenhagen

DeepWind-studies

MSc projects





Upper frame: Exhibition model at the EWEC 2012 of the concept

Lower frames: Placement of the generator and view of safety brake device and mooring system

The DeepWind concept (www.deepwind.eu) challenges offshore vertical horizontal axis wind turbines (HAWTs) in several ways:
•It has no heavy nacelle and operates independently wrt. wind direction changes; the centre of gravity lies very deep below the water line
•The rotation of the blades is not directly gravity affected: it has up-scaling potential compared to HAWTs
•The rotating tower, down to the mooring system, has to take loads.

The MS project can take up several topics, such as the conversion of wind into mechanical power. Here the main issue is to compete with conventional HAWTs in fulfilling up-scaling capability. For the 2 or 3 bladed MW wind turbine it means the rotor has to be light weight:

1) Aeroelastic design of a light weight rotor where wind and gravity loads on the turbine are taken into consideration. Here the study is carried out on a turbine that can withstand the load of its own weight and fatigue loads under operation.

Another topic is the analysis of the power absorption: loads on the generator and safety brake device system are of high importance for smooth operation at deep sea. Loads will be directed onto the mooring device system placed 70-150m below waterline.

2) Design of a modular system- a generator and a safety brake device system for safe operation. The design has to consider maintenance issues(mooring design, remote deep sea operation)

Supervisor: U. S. Paulsen(uwpa@dtu.dk) plus a co-supervisor. Computational skills are required in aero elasticity and in hydrodynamics (HAWC2).