TWIND

Twinning for an Offshore Wind Energy Partnership

Call identifier: H2020-WIDESPREAD-2018-2020

D3.3 – Report on online training tutorial for ESRs and professionals in offshore wind energy

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

Lead beneficiary	TU DELFT
Authors List	Axelle Viré
Due date	31/12/2022
Completion date	26/01/2023

Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Document History

Issue Date	Version	Changes Made / Reason for this Issue
26/01/2023	V1	Original version
07/02/2023	V2	Review (WavEC)

This document only reflects the author's view. The programme authorities are not liable for any use that may be made of the information contained therein.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

INDEX

INDEX *3*

1 EXECUTIVE SUMMARY *4*

2 SUMMER SCHOOL *4*

3 SHORT COURSE *8*

4 TRAINING MATERIALS GENERATED DURING STAFF EXCHANGES *10*

5 CONCLUSIONS *10*

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

1 EXECUTIVE SUMMARY

This short document contains references to all the online training materials that were generated during the two training schools described in D3.2.

2 SUMMER SCHOOL

The keynote and short presentations presented at the summer school were gathered from all the participants. The sessions of the summer school were also recorded using the Zoom webinar platform. Permission was obtained from the participants during the registration process for recording video and audio. All the recordings (except of the first morning) and the presentations have been made available publicly through the training portal in the TWIND project website: https://twindproject.eu/training/ This is also shown on the screenshot's hereafter.

TWIND Online Summer School
5th – 9th July 2021
Links to the presentations and recordings

👉**Monday July 5th 2021**

- **Morning session: Data-driven Modelling (C)**
  - **Recording: NOT available**
  - **Presentations:**
    - **C-KN1 – Richard P. Dwight – TU Delft**
      "Data-driven approaches to physical modelling in CFD in CFD"
    - **C-SP1 – Craig White – Wavec Offshore Renewables**
      "Techno-economic assessment of floating offshore wind turbines to reduce LCOE"
    - **C-SP2 – Deepali Singh – TU Delft**
      "Data driven surrogate modeling for load prediction on offshore wind turbines"

- **Afternoon session: Aerodynamics (A)**
  - **Recording:** YouTube
  - **Presentations:**
    - **A-KN1 – Axelle Viré – TU Delft**
      "Floating offshore wind energy at TU Delft"
    - **A-KN2 – Guilherme Vaz – WavEC**
      "Aerodynamics of Offshore Wind Turbines"
    - **A-SP1 – Ricardo Amaral – TU Delft**
      "Aerodynamics of floating offshore wind turbines undergoing large motions"
    - **A-SP2 – Claudia Muscari – TU Delft, Polimi**
      "On the free stream velocity sampling in AL Models: review and assessment with respect to wake description"
    - **A-SP3 – Marinos Manolesos – Swansea University**
      "Thick airfoils, Vortex Generators, Gurney Flaps and Flatback Solutions: How to get better performance out of the blade inner region?"

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

👉**Tuesday July 6th 2021**

- **Morning session: Hydrodynamics (G)**
  - **Recording:** YouTube
  - **Presentations:**
    - **G-KN1 – Miren J. Sánchez Lara – Tecnalia R&I**
      "Challenges in the hydrodynamics modelling of FOWT"
    - **G-KN2 – Iñigo Mendikoa – Tecnalia Research & Innovation**
      "Mooring System Design for Floating Platforms"

- **Afternoon session: Hydrodynamics (G)**
  - **Recording:** YouTube
  - **Presentations:**
    - **G-SP1 – Federica Perassi – TUDelft**
      "Fluid structure interaction between vertical-axis tidal turbine and floating structure"
    - **G-SP2 – Manuel Rentschler – WavEC Offshore Renewables**
      "CFD code comparison, verification and validation for a floating wind semi-submersible platform"
    - **G-SP3 – Likhitha Ramesh Reddy – Delft University of Technology**
      "Hydrodynamic modeling of floating offshore wind turbines"
    - **G-SP4 – Alistair Lee – Offshore Renewable Energy Catapult**
      "Mooring System Design"
    - **G-SP5 – Daniel Milano – ORE Catapult**
      "Floating Offshore Wind design and modelling"

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

👉**Wednesday July 7th 2021**

- **Morning session: Control Systems (B)**
  - **Recording:** YouTube
  - **Presentations:**
    - **B-KN1 – Jan-Willem van Wingerden – TU Delft**
      "Smart wind farms" (Not available)
    - **B-SP1 – Javier Lopez – Tecnalia**
      "Floating offshore wind turbine vibration control"
    - **B-SP2 – Michael Smailes; Ampea Karikari-Boateng – ORE Catapult**
      "Wind Turbine & Wind Farm Control"
    - **B-SP3 – Daniel van den Berg -TU Delft**
      "Enhanced Wake-Mixing with Floating Offshore Wind Turbines"

- **Afternoon session: Energy Storage & Hydrogen (E) & Hydrodynamics (G)**
  - **Recording:** YouTube
  - **Presentations:**
    - **E-KN1 – Ad van Wijk – TU Delft**
      "Hydrogen the global zero carbon energy carrier"
    - **E-SP1 – Andre Novgorodcev – TUDelft**
      "Development of a Underwater Gravity Energy Storage (UGES) concept for offshore applications"
    - **E-SP2 – Omar Ibrahim – University College Cork**
      "Coupling Floating Offshore Wind Turbine Farms with Green Hydrogen Production and Transportation" (Not available)
    - **E-SP3 – Dr. John Nwobu – Offshore Renewable Energy Catapult**
      "Battery Energy Storage in Offshore Wind Farms" (Not available)
    - **E-SP4 – Dr. John Nwobu – Offshore Renewable Energy Catapult**
      "Towards Achieving Net Zero: Green Hydrogen from Offshore Wind" (Not available)
    - **G-SP6 – Razieh Jalal Abadi – University College London**
      "Large Eddy Simulation of open-channel flow over square bars at different Reynolds numbers"

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

👉**Thursday July 8th 2021**

- **Morning session: Operations and Maintenance (H)**
  - **Recording:** YouTube
  - **Presentations:**
    - **H-KN1 – Donatella Zappalá – TU Delft**
      "Optimization of Wind Farm Maintenance: Reliability and Condition Monitoring" (Not available)
    - **H-SP1 – Mário Alberto Vieira – +ATLANTIC CoLAB**
      "Introducing O&M in Marine Energy Technologies"
    - **H-SP2 – Laurie Wilkins – Jeremy Benn Associates (JBA) Consultings**
      "The effects of climate change on offshore wind operations and maintenance" (Not available)

- **Afternoon session: Operations and Maintenance (H) & Experimental Methods (F)**
  - **Recording:** YouTube
  - **Presentations:**
    - **H-SP3 – Mingxin Li – TU Delft**
      "An optimized opportunistic maintenance strategy for offshore wind farms"
    - **H-SP4 – Chunjiang Jia – ORE Catapult**
      "Data-driven modelling for power module condition monitoring"
    - **F-KN1 – Sara Muggiasca – Politecnico di Milano**
      "Experimental tests on FOWT models"
    - **F-SP1 – German Perez – Tecnalia**
      "Wave tank and wind tunnel experimental campaigns in H2020 LIFES50+ project (GA640741)"
    - **F-SP2 – Felipe Novais – Politecnico di Milano**
      "A Hardware-in-The-Loop System for Model Testing of Floating Offshore Wind Turbines in a Wind Tunnel"
    - **F-SP3 – Alejandro Jimenez del Toro – ÉireComposites Teo.**
      "Automated tape placement of carbon fibre reinforced thermoplastics for offshore wind turbine blades"

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

👉Friday July 9th 2021

- Morning session: Electrical systems (D)
  - Recording: YouTube
  - Presentations:
    - D-KN1 – Paul McKeever – ORE Catapult
      The changing role of electrical systems in the offshore wind sector"
    - D-KN2 – Francesco Boscolo Papo – Tecnalia Research and Innovation
      "Design of dynamic cable for floating platforms"
    - D-SP1 – Will Brindley – ORE Catapult
      "Dynamic Cable Design" – Part I; Part II; Part III, Part IV, Part V

- Afternoon session: Electrical systems (D), Project Management/Farm Design (J) & Offshore Wind Potential (I)
  - Recording: YouTube
  - Presentations:
    - D-SP2 – Pan Fang – Delft University of Technology 3ME
      "Bending test of dynamic power cables" (Not available)
    - D-SP3 – Manuel Rentschler – WavEC Offshore Renewables
      "Dynamic cable research at WavEC – Layout optimization & bending experiments"
    - J-SP1 – Amorina Gonzalez Armayor – WavEC
      "The use of project management to reduce costs"
    - J-SP2 – Matteo Baudino Bessone – Delft University of Technology
      "Review on floating offshore wind farm design: identification of the interactions between subsystems"
    - I-KN1 – Rodrigo Rojas – National University of Costa Rica
      "Offshore wind potential in Costa Rica: Boosting a plan towards road map"

3 SHORT COURSE

The short course took place in Delft in October 2022. The lectures are described in D3.2. Lecture materials have been made available to all the participants and they are also shared publicly on the TWIND project website: https://twindproject.eu/training/

This is also shown on the screenshot hereafter. In addition to training early-stage researchers and exchanging knowledge, the course was also a good opportunity to meet between junior and senior staff. An informal dinner was organised on the last day. A photo with some of the participants is attached.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

TWIND SHORT COURSE – Design and Testing of Offshore Wind Turbines and Farms
17-21 October 2022
Links to the presentations

👉 SCHEDULE

👉**Monday October 17th 2022**

- **Axelle Vire – TU DELFT**
  "Welcome and course introduction"
- **Michiel Zaaijer – TU DELFT**
  "Wind farm design"
- **Michiel Zaaijer – TU DELFT**
  "Wind turbine rotor design"

👉**Tuesday October 18th 2022**

- **Dries Allaerts – TU DELFT**
  "Atmospheric phenomena for wind energy"
- **B.C. (Bart) Ummels – TU DELFT**
  "Electrical infrastructure"
- **George Lavidas – TU DELFT**
  "Offshore resource"

👉**Wednesday October 19th 2022**

- **Jan-Willem van Wingerden – TU DELFT**
  "Control – Fixed turbines"
- **Jan-Willem van Wingerden – TU DELFT**
  "Control – Floating turbines"
- **Sebastian Schreier – TU DELFT**
  "Floating support structures and moorings"

👉**Thursday October 20th 2022**

- **Donatella Zappalá – TU DELFT**
  "Wind farm maintenance"
- **Wim Bierbooms – TU DELFT**
  "Wind loads"

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631

Photo: Dinner organised at the end of the TWIND short course, to facilitate networking between early-stage and senior staff. Note that the photo only shows a limited number of participants.

4 TRAINING MATERIALS GENERATED DURING STAFF EXCHANGES

Several senior and junior staff exchanges have taken place between the four beneficiaries during the project, as explained in e.g. D3.4. During these exchanges, informal discussions and knowledge sharing have taken place between the participants. This led to short PowerPoint presentations being exchanged bilaterally between the partners.

5 CONCLUSIONS

Despite the COVID pandemic, the TWIND project achieved its objective of training more early-stage researchers to the field of offshore and floating wind energy. The summer school that was supposed to be taken place on-site had to be moved to an online setting due to COVID. By contrast, the short course took place on-site and was a great opportunity for the early-stage researchers to meet face-to-face with senior staff. All materials generated during these training activities are openly available online.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 857631