

Newsletter Edition 3, July 2021

Project Overview

Launched in January 2020, WindEXT is an ambitious European funded project. The goal of the project is to develop specialized training integrating digital tools like Virtual Reality or 360° video tours to complete the classical theoretical methods. The project is also an advanced integration of partners of different profiles and experiences to facilitate the exchange of knowledge between Universities, Vocational Training centers and private companies, in a model that it is now followed in different countries to facilitate the employability of students leaving both types of centers.

The goal of this approach is to reduce the LCOE of the windfarms in operation, either existing or new ones, by increase the quality of O&M services while extending the lifetime of the assets and the working HSE conditions of the maintenance personnel. The duration of the project will be three years, so it will end up in December 2022.

The WindEXT project receives funding under the [ERASMUS + programme](#) of the European Union.

Project situation

After some discussions, consideration of criteria and evaluations of different platforms, we decided to combine our newly developed trainings on one Moodle WindEXT platform. This platform has the below structure to gathered all the contents and to facilitate the acces to the digital tools indicated in the figure.



In the field of WindEXT simulation, the simulator WExSiM will use the most advanced technologies of Virtual reality and it will integrate in 3D Wind Turbine Generator (WTG), different maintenance procedures and check lists which will reproduce the real conditions in a wind farm.

Complementary, WExLaB will show different approaches to present the WTG operation based MATLAB Simulink®, the goal is to show to the students a wind turbine running in normal conditions as well as the main reasons of potential faults.

The other tools developed in WindEXT like WExViR will present, various scenarios with the help of the H5P platform. For instance, an important area of interest is going to be the development of a specific digital tool for the fault tree

analysis.

Why had we chosen Moodle?

Moodle is freely available open source software (under the GNU Public License). Essentially, this means that Moodle is subject to copyright, but gives the user certain freedoms. The software may not be changed or deleted, provided that the source code is available to others, and these license conditions also apply, copied, used and further developed for all further developments. This also corresponds to the specifications for the results that we create as part of our funding project.

Moodle can be installed on any computer that can process PHP and supports an SQL database (e.g. MySQL). Moodle can run on Windows and Mac as well as on a wide variety of Linux servers (e.g. RedHat or Debian GNU).

Moodle provides virtual course rooms. In these, working materials and learning activities are provided. Each course can be configured so that only registered participants can attend it, guests are allowed or a password is required to participate. Different course formats allow a "weekly overview", a thematic structure, a central forum or a SCORM learning unit in the center.

Working materials in courses are texts, links and files. Learning activities are forums, tests, tasks, lessons, wikis, etc. The arrangement of working materials and learning activities allow different didactic scenarios that can follow an instructional or constructivist learning model.

The users have different rights as trainer / lecturer / teacher or participant / student / pupil via assigned roles in the course room or for individual activities. In addition to the standard modules, around 1000 additional modules are available on the Moodle website. It is then also possible to integrate our developed trainings in H5P or MATLAB Simulink® on the Moodle platform.

Project progress

The structure of the reference training course (it can be handled independently, contents and digital tools) has been already defined and previously shown. It will follow the scheme already defined in the application supported on the following tools:

WindEXT Virtual Reality WExSiM

It is planned to develop the training for the Oculus Quest 2. This hardware has the advantage that it can be operated as a standalone solution and therefore no computer and no internet connection are required.



In a first phase, 4 procedures have been developed and implemented:

- Maintenance and replacement of a yaw motor
- Use of the hydraulic holding brake
- Evacuation from service lift
- Hydraulic tightening of screw connections

The basic structure of the simulation provides that the user can choose the required and complementary tools in a warehouse, there is an area in which the current scenario is explained (including pictures, videos, instructions) and the "play area" gives. The videos can also be reproduced in the handsets as additional information, as it is shown in the following picture. The videos are also linked on our webpage www.windext.com and you can watch them on our YouTube®-channel WindEXT.



Picture 1: Virtual reality supported by real images through video

WindEXT Laboratory WExLaB

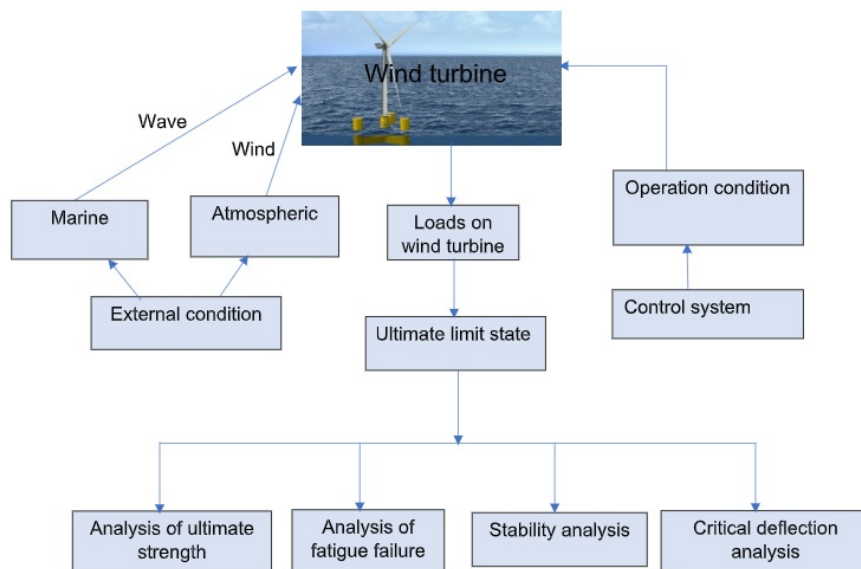
This part of the training material will allow students to gain a basic understanding of how a wind turbine is designed and operated, including a description of the basic components. The students will should an appreciation of how the components function as a system and how wind turbines are connected to the grid in the form of a wind farm including aspects of layout optimization, e.g. minimization of wake losses. Students will be taught about the common faults that are experienced by a wind turbine, their root causes and consequences. Through the use of simulation software, students will be able to see how common problems such as yaw and pitch misalignment give rise to reduction in power output and adverse loads.

Learning Outcomes:

- To understand the purpose of function of the major components of a wind turbine
- To understand how a wind turbine generator works as a system including the loads experienced and the power generated (see the case of an offshore wind farm in the following picture)
- To understand how a wind turbine is controlled
- To understand how wind turbines are operated together efficiently as a wind farm including the role of other balance of plant, e.g. the network
- To be able to describe the common faults experienced by a wind turbine, including their frequency and severity
- To understand the underlying causes and consequences of common faults
- To experience how common problems such as pitch and yaw misalignment affect power output (and loads)

Training Materials:

- Online lectures
- Written material
- Visualisation software
- Interactive simulation software
- Online assessment (e.g. multiple-choice questions)



Project meetings

Due to the pandemic restrictions, the consortium has handled monthly call meetings. In spite of these restrictions to have so often meetings have had a positive impact in the project progress, taking into consideration its complexity and the different cultural approaches of the consortium members.

Third meeting, February 2021

Our third transnational project meeting took place on February 3rd and 4th, 2021. Due to the current situation in the Corona Pandemic, this meeting could only take place as an online meeting. In order to do justice to a transnational meeting, we organized a two-day meeting. At this meeting the decision on the Moodle platform was made and the next steps in the three areas were discussed. In addition, the administrative matters were discussed, as the project will soon be halftime. The project partners were also reminded to take an active part in dissemination work.

Forth meeting, late summer / Autumn 2021

We hope that we can hold our next transnational meeting as a face-to-face event again. For this reason, we are still keeping the possible date open in order to be able to await further developments in the corona pandemic. Place of the forth will be the University of Cyprus.

Dissimination and Exploitation of project results

On the project website www.windext.com, all results will be published. There will be also published 6 newsletters during the project. If you are interested in this newsletters, you can register in our database at info@windext.com to get newsletters automatically. Finally the project has its own Twitter channel. Follow [@Wind_EXT](https://twitter.com/Wind_EXT) and you will be informed about the current project status.

Project consortium

A consortium of European key players in the Wind Industry (entrepreneurial associations and maintenance companies), Universities and training centres come together, to create the reference training course WindEXT. The presence of UTEC/CEFOMER from Uruguay is considered fundamental to adapt the contents to another sociological/legal scenario as the LATAM countries.

Project Leader:
Asociación Empresarial Eólica (AEE)



Projectpartner



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