



windEXT

Advanced maintenance, lifetime extension and repowering of wind farms supported by advanced digital tools

Newsletter Edition 2, January 2021

Project Overview

Launched in January 2020, **WindEXT** is an ambitious European funded project. The goal of the project is to develop specialized training that will allow reducing the LCOE by reducing the OPEX, increase the quality of O&M services while extending the lifetime of the assets and the working 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

The project picks up speed!

Despite the Corona pandemic, work could be started in all work packages. Our Spanish and French partners, who are most affected by the pandemic, have also started their work in the project. The fact that the topic of "digitalization" has become extremely central, especially in the present time, is motivating for everyone and that our research project has thus once again gained in relevance. It has not been possible for months to carry out face-to-face training and the current situation suggests that this will not be possible in the coming months either. For this reason, the digital tools developed in this project will help **WindEXT** to offer high-quality training even in such times.

All partners for themselves, but also we as a project consortium have found ways to push the project forward. This included numerous online meetings in recent months, which also replaced the second transnational meeting to be held in the Netherlands. As things stand, this situation will continue in the coming months, so that we as a project consortium assume that the third transnational meeting, which is planned in March 2021, will also have to be replaced by an online meeting.

According to the work plan, most of the activities have been already started with some initial difficulties to specify the role of the partners included in the application form. A summary of the tasks to complete the MAG (Management and Administrative Guidelines) are presented in the below table:

Responsible	TASKS
8.2 CONSULTING	Consolidation of the different modules in the training course structure
	360° Video tour in the WTG
INESTEC	Proposal of discussion forums
	Description of the WTG generators and converters to be integrated in the simulators
	Evaluation of the use of Virtual Labs
UCY	Proposal of Hangout sessions
	Proposal of evaluation procedures: automated digital assessment methods
	Integration of the and contents in the virtual lab
UTEC	Proposal of Hangout sessions: procedures to open the discussions with many LATAM participants
	Proposal of evaluation procedures
	Selection of the centers in LATAM to use simulators and digital tools
TESICNOR	Evaluation of the actual state of the 3D WTG model and needs to enlarge with new components
	Analysis of other digital 3D WTG
	Needs to develop new tools, specifically for the initial maintenance procedures
	Integration of digital images and videos already developed
	Integration with other videos, serious games, ..
	Use of different smart devises
TUD	Use of simulators to show the main wind power concepts
	Use of simulators to demonstrate the different control modes
	Use of simulators to show the WTG operation
	Description of the operation of main components
UCLM	Maintenance contents

	Elaboration of the check lists, diagnosis and corrective actions
	Description of the electrical topologies, wind farm layouts
	Use of simulators for wakes effect
DP2I	Fault tree analysis
	Typical diagnosis procedures
	Selection of the actions to extent the WTGs life
	Criteria for the plants repowering

The partners do not mention in the above table will follow with their activities as initially foreseen.

Such as stated in the proposal, the goal of **WindEXT** is to create a training program where different simulators and digital tools will be integrated. Our intention is to standardise the training contents and to introduce new approaches to facilitate the vocational training before starting in the wind farms. Part of the tools developed in the project could be used afterwards in the professional life, specially the evaluation of the fault root causes, digitalisation and use of simulators.

Project progress

The structure of the training course has been already defined and it will follow the already defined in the application form and outlined in the below packages:

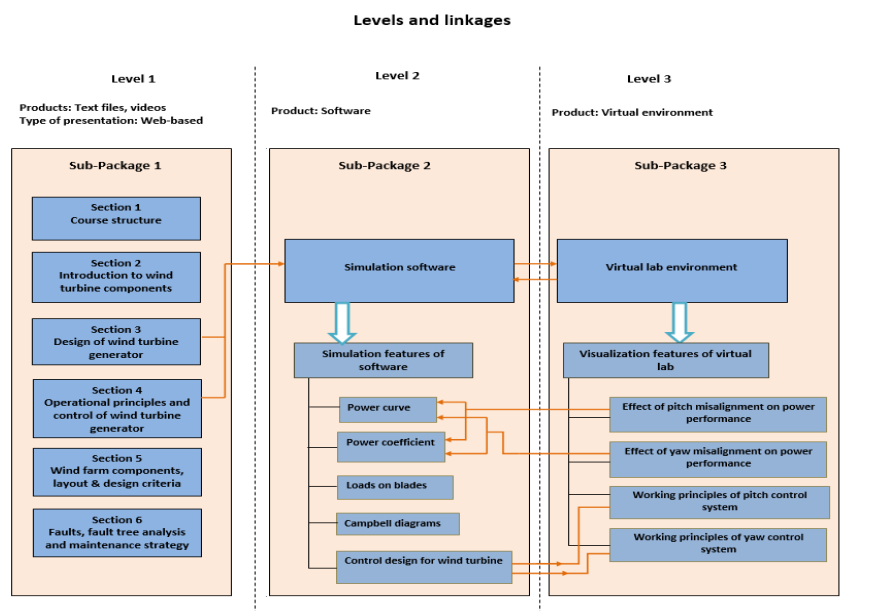


Illustration 1: Work organisation

The general draft structure for the teaching material of WP4 (MODULE B: General description and critical components) has been outlined along with learning outcomes and proposed training materials. There have been discussions with partners about how some of the material could be taught through the use of software tools (e.g. FAST/Matlab) and the use of 3D visualisation. The wind turbine has been broken down into subassemblies and a more detailed process diagram developed which will be used to link to the training material. Discussions are ongoing with partners and how to link to material on fault trees and condition monitoring.

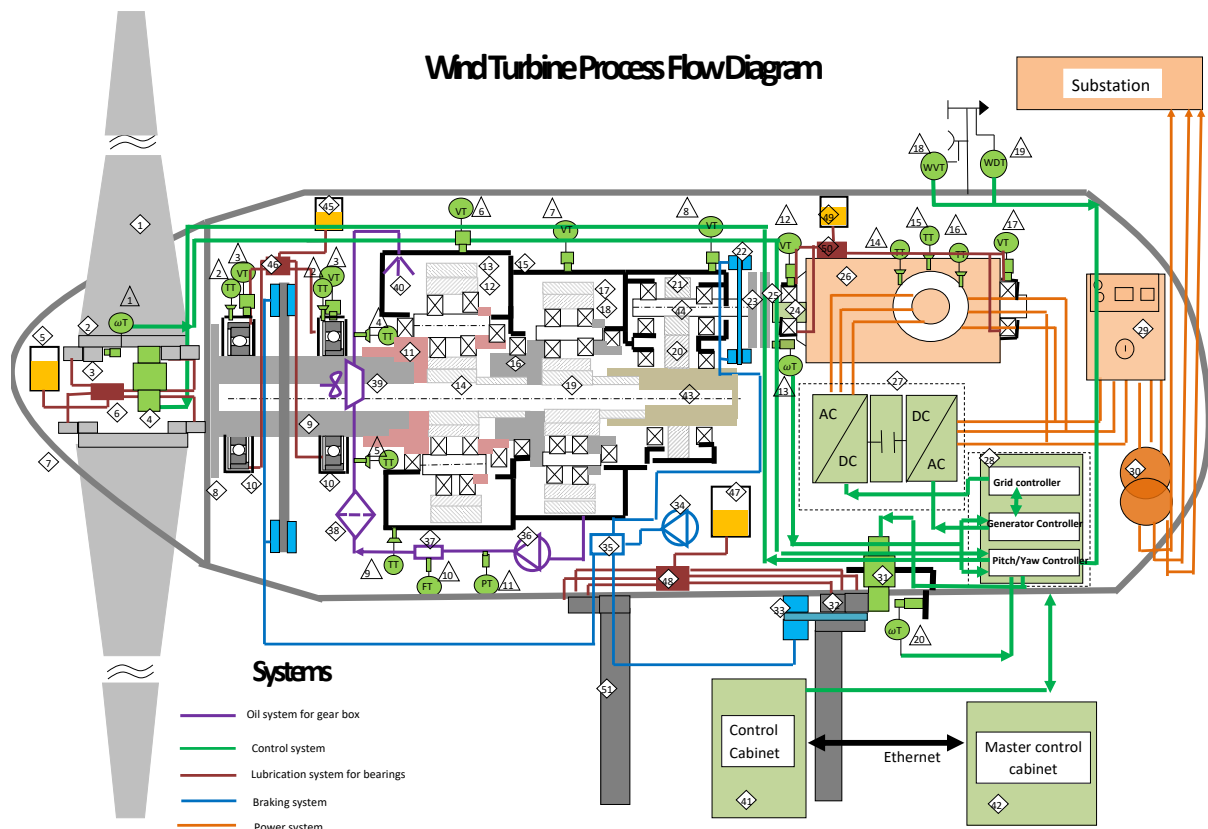


Illustration 2: Overview inside the nacelle 360°

Another important project challenge of the project is the selection of open source software to be afterwards disseminated among the vocational center. An interesting approach of the project is the combination of University Centers to develop training tools to be afterwards used in centers with a more professional orientation.

From the digital point of view a 360° tour has been organized in an existing wind turbine in operation to show the main components which will be afterwards digitalized, an example inside the nacelle is below presented:

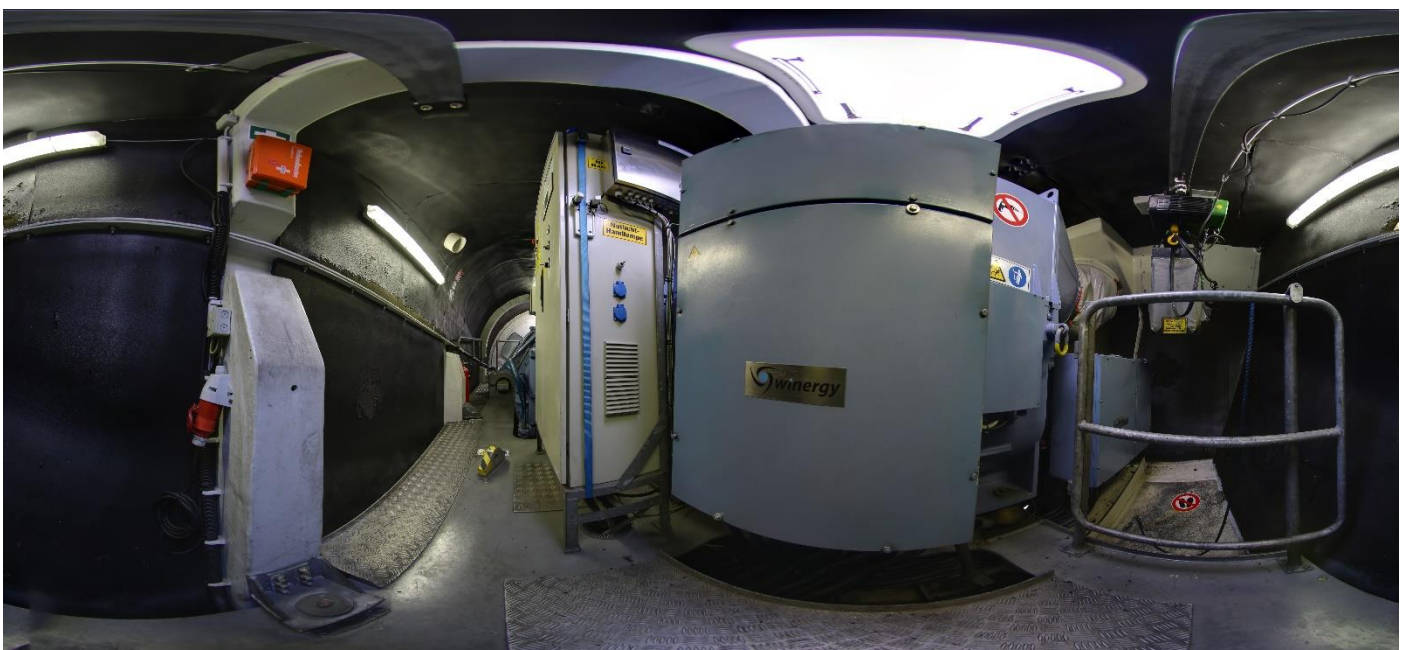


Illustration 3: Overview inside the nacelle 360°

One of the most complex decisions in the project has been the selection of the hardware/software to support the future digital developments between, for instance, tethered headset (already used in SIMULWIND) or standalone (Oculus Quest), not yet decided because each of them has advantages and constraints. The decision is not easy because it was considered fundamental to take advantage of the enhancements of SIMULWIND but simplify them to facilitate their integration in cheapest hardware.

The first digital tools already developed for the project were done in Oculus, below another picture of emergency evacuation in an elevator, which will be afterwards integrated in its corresponding section of the training course:

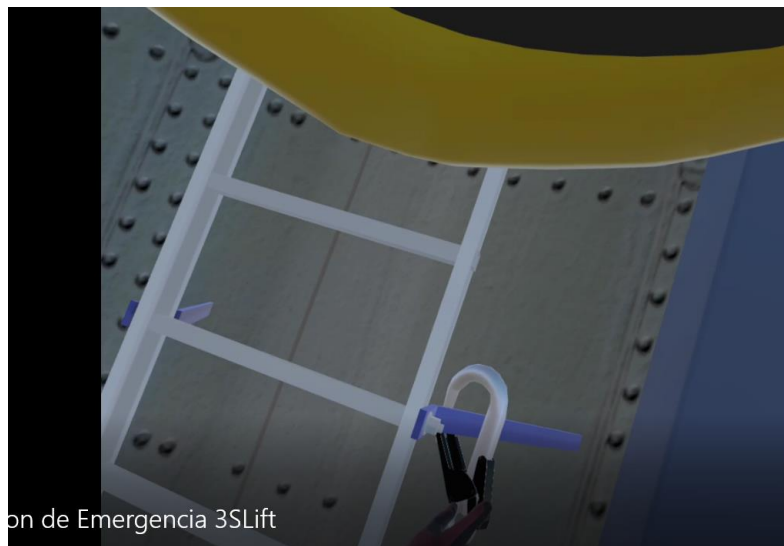


Illustration 4: Lift emergency evacuation

In the present project stage, some of the partners are concentrated in the root cause analysis which will be integrated afterwards in the new digital tools, a first approach is presented. Normally it is not easy to identify the causes of a fault because it could be due to different reasons:

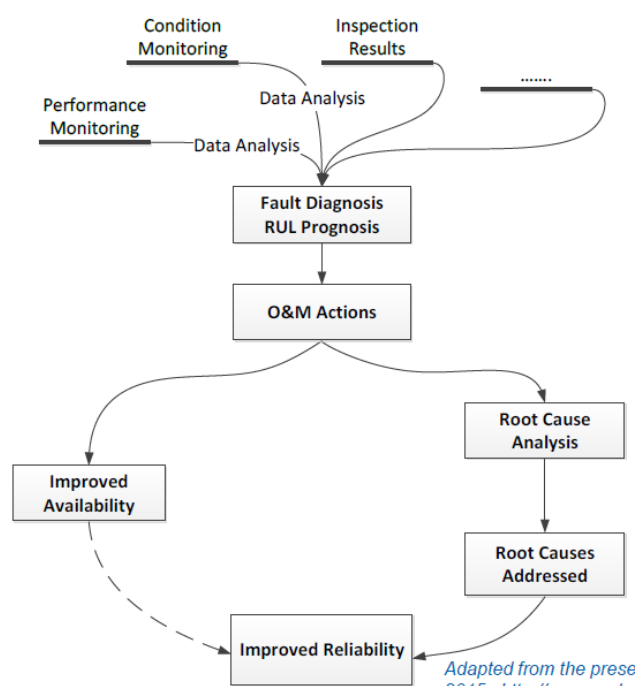


Illustration 5: Scheme for the root cause evaluation

About the contents the structure is presented and it is advancing as initially foreseen.

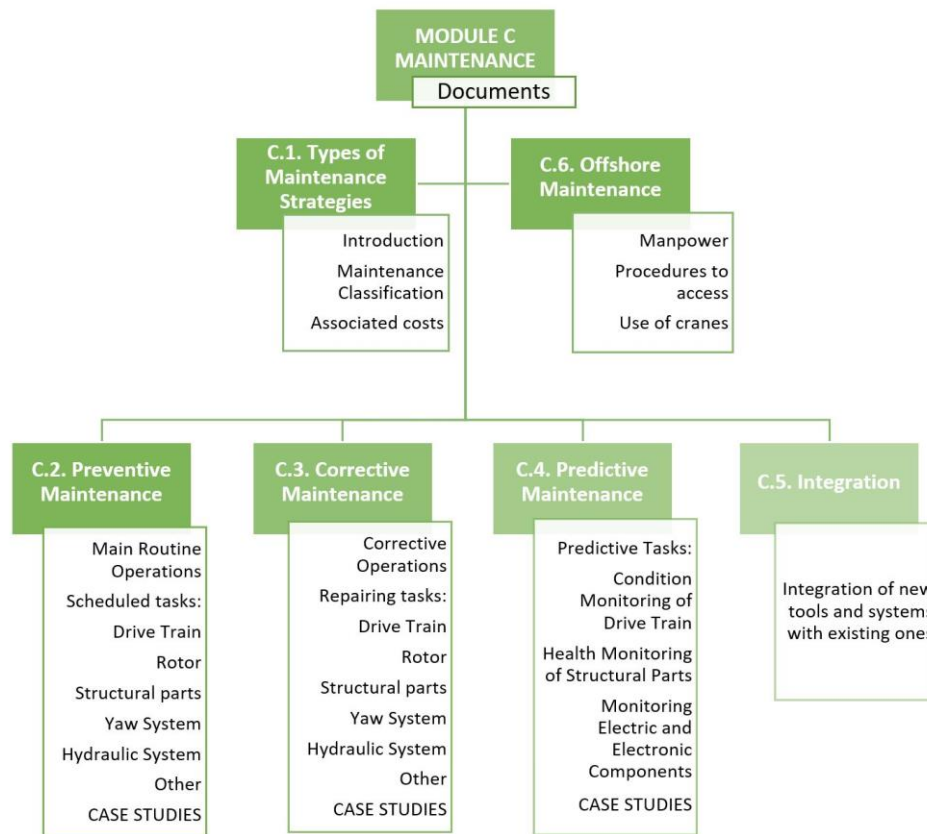


Illustration 6: Scheme for content structure

An item not yet resolved is the procedure to follow to evaluate the students knowledge based on virtual labs, hangouts and digital assessment methods.

Transnational project meetings

Second meeting, TU Delft, 30. June 2020

At the first TPM in Madrid, the second TPM was set at 30.06.2020. However, the developments in the Corona pandemic did not stop at our research project, so that the meeting could not take place at TU Delft. As a project team, we decided to hold this meeting as an online meeting.

In particular, the next steps in work packages 2 to 6 were discussed. In addition, as in every meeting, organizational things are also discussed in order to the project process, we are 11! project partners to make it as trouble-free as possible.

Third meeting, INESC TEC, March 2021

The third transnational project meeting is scheduled to take place in March 2021 at INESC TEC in Portugal. Due to the current situation in the Corona Pandemic, however, this meeting will also take place as an online meeting.

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:

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