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windEXT

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

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USER GUIDELINES

WP1

Prepared y

AEE

Project consortium

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1. WINDEXT MOODLE structure

The contents of the WINDEXT project are organized in a MOODLE structure but it can not be considered as a standard training course, because to be used for training it has to be adapted to the specific requirements of each training Centre. Therefore, is more a repository of different contents and tools to be later downloaded and integrated in different curricula for vocational teaching.

This WINDEXT MOODLE is organized as stated in the SYLLABUS in four different sections, each one with their own modules:

1.1. Section 1: Introduction to Wind Turbine Technology

This section focuses on the description of the different components of a wind turbine and their function, their design, loads, operation and reliability as well as their integration in a wind farm to be a wind farm power plant. Additionally and as starting point of the following sections, the explanation of the fault tree analysis is also merged in this section. It is constituded by the following modules:

1.1.1. Module1: Introduction to wind turbine components.

1.1.2. Module 2: Design of a wind turbine.

1.1.3. Module 3: Load Analysis of Wind Turbine.

1.1.4. Module 4: Operation and Control of a Wind turbine.

1.1.5. Module 5: Wind Farm Components Layout and Design criteria.

1.1.6. Module 6: Reliability, Failures, Faults ad Fault Tree Analysis. Failure cascade of a specific component.

Complementary information on the SCADA (Supervisory Control and Data Acquisition) is here included to give a comprehensive general overview of a wind farm.

1.2. Section 2: Maintenance

A vision of the maintenance of a wind farm from both, general and specific points of view are here included, split into the following modules.

1.2.1. Module 1: Types of Maintenance

1.2.2. Module 2: Preventive Maintenance

1.2.3. Module 3: Corrective Maintenance

1.2.4. Module 4: Predictive Maintenance

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1.2.5. Module 5: Offshore Maintenance

1.2.6. Module 6: Contractual Models

1.3. Section 3: Life extension and repowering

This section covers how the life of wind farms can be extended, it addresses the cost of repowering and presents wind turbine refitting as an alternative, with the following modules:

1.3.1. Module1: Identification of the main criteria to define the extension of the WF life.

1.3.2. Module 2: Diagnosis Procedures and Remaining Useful life by components.

1.3.3. Module 3: Repowering

1.3.4. Module 4: End of life cycle

1.3.5. Module 5: Failure cascade of a wind turbine component

1.4. Section 4. WINDTOOLS

This Section is not assigned in specific Modules and it gives the instructions to download and install three kind of computer tools:

- WexSiM: for the OCULUS 2 hardware
- SIMULWIND for different google alternatives
- WexLab: MATLAB simulators of the WTGs operation
- CadWex: gearbox faults root causes.

All the SECTIONS have a similar structure but with different thematic focus taking into consideration the several contents and scope, reinforcing then the independent use of the Modules and the specific tools developed within the WINDEXT project.

2. ACCESS TO THE DIFFERENT SECTIONS

Once you have entered in WINDEXT MOODLE you need to create a profile to followed by the coordinator of the project. Your name will be included in the Grades part of the menu as student (teachers are reserved for the partners representatives).

Once you are in each section and modules above described, you have different options:

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2.1. SECTION 1: Introduction to wind energy technology

Simillarly to the rest of the SECTIONs, in the beginning there is a Virtual Room, reserved for personal information, chatas and recorded videos (different to thirds Complementary Information at the bottom of the SEECTION9.

This SECTION in itself starts with a short presentation, the learning outcomes and a review of leanings.

In each module you will find part or all of the below topics:

2.1.1. READ IT:

- Contents in pdf formats, two options:
  - Dowload if they are of open access.
  - View if they have a lock.
- H5p: general information to be followed.
- Videos: they will explain the main characteristics of the WexLab Simulators.

2.1.2. APPLY IT

To use the above contents, you will have different options:

- To check your learning in the bottom QUIZ
- To simulate with the WexLab simulators different scenarios and cases
- To understand the procedure, apply for the CaDWex root fault causes.

The SECTION is completed with the QUIZ Questionnaire to review the main learnings as mentioned

Additionally, to the MOODLE specific contents you can also check the complementary information. This part will be reviewed periodically to integrate the most interesting progresses on the section contents.

2.1. SECTION 2: Maintenance

This SECTION is mainly oriented to teach on the main maintenance procedures as well as additional information on contractual models and it has also a Virtual Rooms for MOODLE WINDEXT users.

It starts with a short presentation of the SECTION, welcome, learning outcomes and announcing the procedure to review the learnings.

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2.1.3. READ IT:

- In this section, here are the contents of the teaching material in pdf format.

2.1.4. APPLY IT

Different H5p tools are here included to review your learnings.:

To check your learning in the bottom you can also find a questionnaire on the main maintenance procedures.

Additionally, to the MOODLE specific contents and H5ps you can also check the complementary information which will be also periodically updated.

2.2. SECTION 3: Repowering and Life Extension

This SECTION is mainly oriented to teach on repowering, life extension and recycling procedures and it is headed by a Virtual Room.

It starts with a short presentation of the SECTION, welcome, learning outcomes and announcing the procedure to review the learnings.

The different modules are organized slightly different to the previous SECTIONS, because they are split into different lessons with the following structure.

2.1.5. WATCH IT:

To watch and see the different interactive videos to learn on the different concepts.

2.1.6. READ IT

Different documents review the contents presented in the videos to consolidate your learnings.

2.1.7. APPLY IT

Different activities are here included to review the achieved learnings of each module.

To check your learning in the bottom you can also find a questionnaire on the main topics of this SECTION.

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Additionally and similarly to the other sections you can also find and check the complementary information.

3. Recommendations

Those are a set of recommendations for using the MOODLE WINDEXT Platform:

- First SECTION has to be reviewed before enter in the following ones.
- Any suggestions or comments have to be introduced in the Virtual Room.
- It is fully recommended to read the contents before to get access to H5p videos or Simulators.
- To download the information is necessary to request it to AEE: vcampos@aeeolica.org.

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