
MAINTENANCE SIMULATOR: A TRAINING TOOL FOR THE SUSTAINABILITY OF EUROPEAN WIND FARMS



Project N°: 2017-1-DE02-KA202-00426

AEE PILOT TEST

Introduction and agenda

The main objective of this meeting is to test the beta version of the simulator to evaluate its quality and its effectiveness as training tool in order to improve the final version of the simulator. AEE chose to test it directly with one of the main final users that the simulator would have that are the students. For that reason, the students that were undertaking the AEE training course (24 in total) in Wind Farms maintenance had the perfect profile to verify the simulator usefulness

The pilot test session took place the 21st October in the Training Center with the following agenda:

10:00h Presentation of the project and the Virtual Reality Simulator
10:30h Simulation tools: differences between VR and 2D simulation
11:00h Introduction to the use of controls and the maintenance procedure
11:15h – 13:30h Simulator Individual test with the High Speed Shaft Maintenance procedure

After each personal test the students were required to express their experience and practical views by filling up a questionnaire in order to improve the simulator prior the final version to be released at the end of the project.

Given the great interest attracted during the Pilot session and having a limited time, AEE extended the Pilot test scope so that all the students from AEE Maintenance training course had the opportunity to schedule a private session to test individually the simulator having the time to complete fully the first maintenance procedure added to the simulator.

Evaluation questionnaire results

The evaluation questionnaire was structured in five different blocks, which are:

- I. Usefulness of the explanations about the simulator use
- II. Quality of technological interaction
- III. Quality of the practical procedure
- IV. Opportunities for a deeper learning
- V. General evaluation of the simulator



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The results of the answers to those blocks are summarized in Figure 1. The simulator obtained a general evaluation in the pilot test considering the graphic design, ease of use, contents and relevance of 3,8 over 4 points.

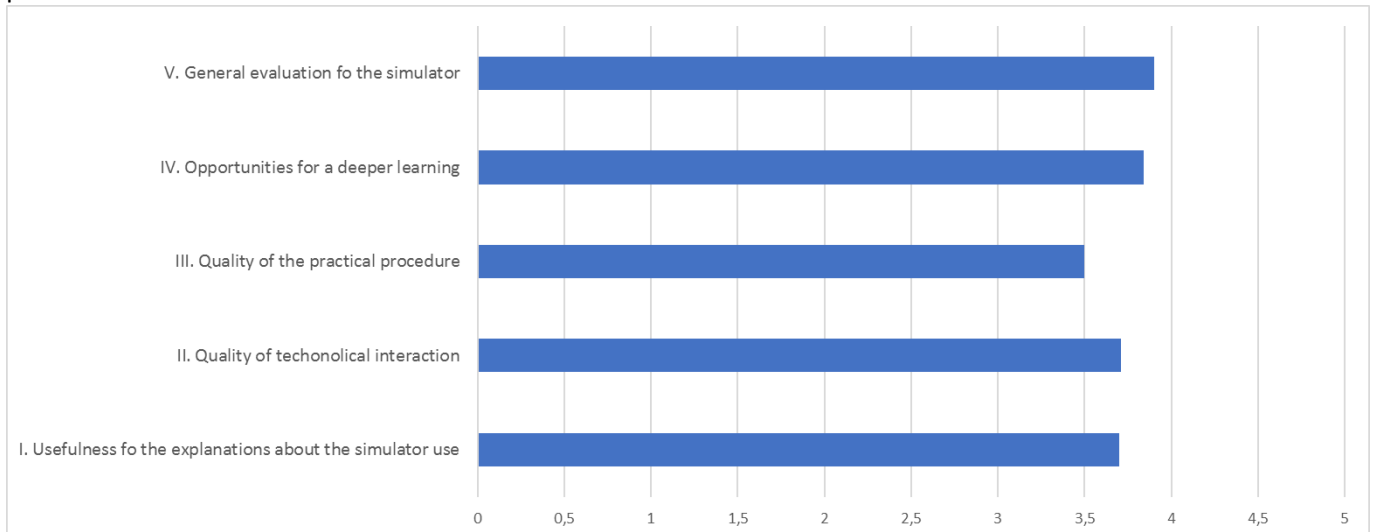


Figure 1. Evaluation results

As it can be observed in the graphic the results obtained are very good and the first reaction received by the teacher from AEE, assisting in the use of the simulator, was very positive because the students have a real feeling of working inside the nacelles. All the questionnaires included some points to write down the personal observations and comments. These comments are critical on specific points as they will serve the project to improve the tool and develop a VR tool with even higher quality. Some of the comments received are copied just below:

- It suits perfectly what have been learnt at the training course.
- The design of the tool is perfect, it is very intuitive.
- It would be better to include a brief summary of the requirements of the activity. It would be more useful than discrete orders.
- The necessity of using the PPEs is repeated during the maintenance procedure and, even if it is important, it extends the duration of the practices.

AEE has learnt in this pilot test that the simulator is really useful for training courses especially for the activities already integrated, mainly the blocking of the high speed shaft and the greasing of brake components. The main challenge is now to incorporate new maintenance procedures and to complete those already preloaded, as for instance the reparation of the gears of the blade changing pitch system



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A clear advantage of the simulator is to show several maintenance procedures in almost real conditions even before to get access to the nacelle and also to be familiar with texts and real images of the components to be repaired. In this sense, the introduction of additional texts and videos help to get a better knowledge of components, tools and the maintenance actions which complete those presented in VR.

Conclusions

The experience of the Pilot Test was very enriching for both parties, AEE and the participants. All the comments were considered very relevant and some of them were taken into account in order to improve the Virtual Reality Simulator.

We consider that the individual experience with the students made a real difference in the perception of the VR simulator and helped the users to put in practice what they have learnt during the theoretical classes.

Some aspects need still to be improved, for instance some texts that pop up during the simulation need to be improved in order to supply more accurate information to the users, but the overall operation of the simulator goes smoothly and the final state of the tool has exceeded the expectations of the consortium.

