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Wind 2 PRO



WindPRO
Advanced Courses 2010

EMD
www.emd.dk

**Wind
PRO** Software for wind energy project and planning

WindPRO 2-Day Advanced Training Course

During the Advanced Course you will learn how to utilise the advanced features in WindPRO for project development, and you will gain inspiration and new ideas for your work within the field of wind power project development. The course will be divided into sections where each deal with core elements of wind farm project development.

Day 1: Establish and evaluate data + validation of model and data + Environment issues.

Building the WindPRO Model:

Background maps, height contour and roughness data are all core components of the WindPRO model. Review of the ON-LINE data will be given. You will learn techniques to maximize the use of the objects associated with the foundation of your model. Demonstrations will cover merging background maps, nested height contours via the EMD Editor, and height contour steepness checks to name a few.

Some of the new 2.7 features: Distance circle on layer objects. Google Earth improved export, new import from .kmz. Calculation time/duration/version. Results in object list/as label on map. History log. Auto save/recovery file. Save as. Activation/deactivation – activation limitations.

Wind Measurement Analysis:

Large wind farm developments often contain multiple met masts within the area of interest and this project site will be no different with multiple masts on site. The METEO module and the accompanying Meteo Analyzer will be used to perform detailed meteorological analysis and data substitution. Also, the PHOTOMONTAGE module will be used to perform a verification of instrument measurement height and the terrain model shape around the mast.

New in 2.7: “Merger” in meteo object to reduce the effects of tower shadowing when measuring with 2 anemometers in same height. General binner. Import/export improvements. Comments input by graphic review. Refresh ON-line data.

Wind Model Validation:

Once the WindPRO model is built and the met data properly analyzed, the model itself can be verified. Using the Meteo Analyzer, mast self predictions and mast to mast cross predictions will be performed to evaluate the WindPRO model and any discrepancies that may exist between masts.

New in 2.7: RIX analyzer based on cross prediction. Access to WASP parameters from all parts utilizing WASP. Roughness areas used direct (no export to lines), but not fully WASP compatible.

Long-term Correction of Wind Measurements:

A long-term correction of the wind data must be performed to make the data representative of a much longer period than the usual one or two years of on-site measurements. The issue of long-term correction including our own experiences with MCP methods will be discussed along with an exercise utilizing the MCP module.

New in 2.7: access to NARR data, calculation of variability.

Enhanced Wind Resource Map Calculation Techniques:

In this modern era of wind energy development, many times bigger is better and very large projects are created within WindPRO. WindPRO 2.7 contains upgraded features in the RESOURCE module to assist with speeding up work with these very large projects. We will explore the new multi-core/multi-PC wind resource calculation setup and show how it can significantly speed up wind resource map calculation times.

New in 2.7: the wind rose tool for detailed analysis of the site wind conditions.

Environment issues:

For many sites the environment restrictions are deciding the layout restrictions for wind farms. In the future we will see more refined turbine control strategies that can utilize sites with environment restrictions better. One of the tools coming up for supporting this development is the NORD2000 Noise model, that handles directional noise calculation as well

as detailed inclusion of terrain features. Radar installations are sometimes a problem. Effect on these can now be calculated from ZVI. Finally the other environment calculation modules DECIBEL, SHADOW and PHOTOMONTAGE all has got a "brush up" in 2.7 where we will demonstrate the major improvements.

Day 2: Wind farm design + AEP calculation incl. loss/uncertainty + grid and model issues

Optimizing the Wind Farm Layout:

Limitations of land, wind resources and restriction zones are key elements when finding the optimal locations for turbines in a wind farm. The WTG area object will be focused upon with ways to limit the wind farm to certain areas and spacing and to respect restricted zones. A demonstration of limiting the wind resource map calculation to the area of interest to minimize calculation time will be made as well as a review of the existing and new optimization options within the OPTIMIZE module.

New in 2.7: the noise optimizer, featuring the new filler and steepness as exclusion areas.

Designing the Wind Farm/ Energy Production Analysis:

This is not a trivial task, as it includes multiple variables. We will guide you through several of those and demonstrate the capabilities of WindPRO for reaching the best project at the given site while also including more practical issues. A few key headlines:

- Combine energy optimization, suitability and environmental restrictions.
- Consider infrastructure, mainly roads and grid.
- Turbine selection – IEC class, cost/MWh, reliability, delivery time

As part of the design, we will especially focus on the many calculation options available in the PARK module. Different approaches to the PARK calculation will be demonstrated highlighting the various wake and turbulence models available in WindPRO as well as the modification of wake decay constants and the incorporation of multiple wind statistics into the customized calculation process.

New in 2.7: Time varying calculation, unique for follow up on AEP from existing wind farms. Enhanced power curve and air density handling. Discussion of the possible model weaknesses when calculating large wind farms. Noise optimized wind farm design.

Turbine Suitability:

WindPRO can be utilized to gather the many pieces of information needed for wind turbine site suitability. Hub height average wind speed, extreme wind speeds and ambient and wake induced turbulence will be highlighted during the site analysis. Future WindPRO module with focus on suitability will be introduced.

Connect to the Grid:

With the eGRID module the design of the cable and transformer layout can be accomplished as well as the calculation of electrical losses for the wind farm. A brief introduction to the eGRID module will be given from project developer's point of view and some of the basic calculations will be presented.

Loss & Uncertainty:

New for WindPRO 2.7 is the Loss & Uncertainty module where detailed calculations can be made encompassing everything from losses due to high wind hysteresis to the uncertainty associated with the exact location of the met mast. The capabilities of the module will be explored as well as use it to evaluate the wind farm layout created in the course. The loss and uncertainty analysis is crucial before taking the project to the bank, and it gives unique feedback to the developer in terms of "where can I do better".

Model Issues: Forests, RIX and alternative Models (CFD):

Some models are capable of handling certain types of terrain better than others. Therefore, it is crucial to know and understand the limitations and possible solutions. Features such as the displacement height in the Meteo object (and WTGs in 2.7) and RIX calculations for compensating for WAsP prediction errors in steep terrain will be explored.

New in 2.7: RIX features are much improved in 2.7, direct calculation of RIX bias in Loss module. Displacement height at turbines.



REGISTRATION



In order to register, please either make a copy of this page, fill-in the form and fax the copy to: +45 9635 4446 or use our on-line registration form at: www.emd.dk

- Oklahoma, USA, September 16-17, 2010
- Kassel, Germany, October 5-7, 2010
- Montreal, Canada, November 4-5, 2010

Additional advanced courses may be arranged - Visit www.emd.dk to see updated list of scheduled courses.

Final date for registration is 14 days before the course start (for courses abroad).

Company Details

Company	
Participant	
Address	
Tel:	Fax:
Email:	
VAT. No. (only necessary for EU companies)	

A possible cancellation has to be in writing no later than 5 days before the course start.

We reserve the right to cancel the course presuming the case that there are not sufficient participants.

Practical Information

Prices

1 participant	1 day	Euro	400	US Dollars	600
1 participant	2 days	Euro	780	US Dollars	1.170

Prices in US Dollars may be changed without notice according to the prevailing exchange rate between Euro and US Dollars.

Place

Exact location will be published at www.emd.dk no later than four weeks before the course start.

Payment

Invoice will be sent before the course and payment is due before the course.

Important

Danish VAT will be added to the above prices if no VAT number is provided (only applies to EU-based companies).

Other WindPRO Courses

Please visit www.emd.dk for details of courses held in German, Spanish, Italian and French language.