



# Feature list

New in windPRO 3.2



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## 1.1 NEW: Multiple windPRO instances

- Run multiple instances of windPRO simultaneously and work on multiple projects in parallel. Easily transfer data from one project to another

## 1.2 BASIS: Dynamic background maps

- Getting maps is easier than ever. Just one click and you have global background maps in any zoom level without having to manually import new map parts. Multiple datasets available such as, satellite imagery, topographic maps and OpenStreetMap. More datasets will be rolled out and updated over time.

## 1.3 NEW: MCP tool

- Complete new MCP tool, including slicing test with prediction error calculation
- Comparison of multiple MCP methods and data sets with several quality measure parameters compared graphically
- New Neural Network based MCP Method
- Advanced filter options with auto detection of time offset and veer
- Very long-term consistency test of the reference data with online access to wind energy indices world-wide from multiple data sources
- Uncertainty calculation based on Klintø model (presented at EWEA resource workshop London 2015)
- Includes the very important residual resampling feature with fast and easy evaluation of the effects (improves wind speed distribution)

## 1.4 NEW: METEO flagging/screening/validating

- Define conditions for flags. e.g. Icing, spiking, bad signals.
- Easily screen segments of flagged data and quickly validate it manually, or
- Automatically disable flagged data
- Review consequences of flagging in real time
- Set flags on individual signals or across signals
- Add a safety buffer to flag data before and after a condition is met
- Share your flag definitions

## 1.5 PERFORMANCE CHECK error code handling

- Comprehensive loss evaluation by error codes and error categories
- Auto generation of "missing" error codes by STOP without error code
- Auto generation of Power curtailment error code for easy measurement of loss
- Import/edit error code list with categories. Optional sub-categories, curtailment flags and more

## 1.6 METEO ANALYSER

- Screen data with flags across datasets
- Verification of remote sensing devices in accordance with IEA standard chapter 6.
- More information available when displaying concurrent time-series.

## 1.7 METEO, more improvements

- Handling of new signals: inflow angle and veer
- Wind profile view now fully supports directional displacement heights
- Comprehensive shear by direction creation (Matrix) and graphic evaluation

- Create wake-cleaned time series – use PARK model to establish
- Direct download from third party data servers. Currently supports Ammonit servers
- More flexible export

## 1.8 PARK calculation

- Fully formula-based conversion between WDC, TI, Roughness length and height. Will give slightly revised WDC recommendations.
- Sector curtailment calculation within PARK gives precise wake loss calculation in time-varying and statistical calculations, transferable to Loss & Uncertainty module. In this version only shut down of turbines are handled. Later, power reduction will be included along with other curtailment features.
- Specify start-stop times for WTGs, for intelligent handling of repowering or expansion projects.
- Original N.O. Jensen model now available (default) in time-varying PARK calculation
- Start-Stop dates included in existing DK WTG data download from EMD server
- Wind distribution now part of output from time-varying calculations
- Park2 (new N.O.Jensen variant from DTU included in WAsP 12) to be included in service pack.

## 1.9 ENERGY calculations, general

- Air density setup more simple and intelligent \*)
- Weibull fitting method updated with small adjustments \*)
- Wind speed dependent A-par. Ratio in Scaler (more precise shear calculation, while WAsP stability correction depends on wind speed). \*)
- Zero power curve optional, e.g. for “night shut down”
- New ORA (Optimized Roughness Approach) model using forest heights and displacement height calculator to handle forests more precisely
- Support for WAsP 12 when WAsPSuite-2018-01-29-A or newer is released by DTU.
- WAsP interface module includes displacement height calculation by sector in profile analyses
- All calculations are now performed in UTM-WGS84 before being presented in user-selected coordinate system. Thereby e.g. using Geo system no longer will prevent WAsP calculations. \*)
- Coordinates included in scaler WAsP calculations, which bring in Coriolis force \*)

**\*) Can change results when recalculating projects.**

## 1.10 SITE COMPLIANCE & LOAD RESPONSE

- New generic response models for ‘direct drive’ and for ‘very large rotors’ (>160m)
- Allow class S assessments for Load Response
- Improved shear calculation (sometimes shear from freq. tables caused problems)
- Added extreme wind method EN1991-1-4 for other flow models than WEng
- Added COV option for Turbulence based on WEng or WAsP-CFD (based on paper)
- Easier scrolling through a large quantity of turbines
- Paste/import table with multiple WTG settings in curtailment tab
- New option for variable wake width in the Frandsen model
- Visualize partial fatigue damage distribution for each WTG sensor including shutdown rules.
- IEC61400-1 ed. 4, to be included in service pack when the standard is released

## 1.11 IEC 61400-12-1 terrain/direction evaluation

- New FREE module in 3.2. Test if the IEC 61400-12-1 terrain conditions for mast and WTG are fulfilled for power curve measurements
- Calculate direction intervals for valid measurements free of wake effects
- Evaluate terrain complexity for calculated or reduced measurement sector

## 1.12 SHADOW, improved receptor input

- Define irregular shadow receptor shapes and definition by coordinates
- Flexible sheltering effects, with gradual change, not just ON/OFF as previous
- Expanded "shut-down planning" handles max. minutes/day and max days/year, and max hours/year

## 1.13 DECIBEL, uncertainty / NORD2000

- Uncertainty input option for noise calculations
- ISO handling of pure tones
- Updated Nord2000 solver with fixes of known issues and improved speed
- $L_{den}$  calculation with Nord2000 (e.g. for Norway)
- ISO 9613-2 Deutschland (Interimsverfahren)
- Optional addition of reflection from walls to be included in service pack

## 1.14 PHOTOMONTAGE, large image handling

- Very large image files (>500MP) can now be handled by rubber tool working on part of image at a time (depending on hardware)
- Rubber tool with "magic wand" makes it fast to erase rendered WTG parts on top of complex structures, like semi-transparent trees
- Visualize very complex structures with .dae files created in Sketch UP, more turbine models now with very precise and detailed rendered nacelles
- Google Earth export based on .dae files available too

## 1.15 Miscellaneous

- Improved folder structure for exporting projects
- Easier PDF generation and preview
- Wind turbine selection with "paired" Power curve and Noise data
- PowerMatrix concept supporting intelligent turbine operation modes and simplification of handling multiple power- and noise mode data sets (experimental)
- Preview of visual data within windCat (Sketch UP integration)
- Auto decimals in legends when viewing Result layers
- Elevation grid now with more purposes for intelligent selection in calculations: Terrain elevation, surface elevation, element heights, water depths
- Access password protected WMS servers
- Generalised exchange format for using external optimizers
- Access map from optimizer for quick manual layout changes
- + Lots, lots more

## 1.16 Removed

- The embedded Google Earth viewer inside windPRO window is no longer available due to new policy from Google. However, it is still possible to synchronize windPRO with the external Google Earth viewer, which will fulfil most demands