

TESTING TIMES



Words: Thomas Arnold, Team Leader Measurements and Technical Testing for Wind Energy Turbines, TÜV SÜD Industrie Service GmbH

Treading a path to and from the filing cabinet is all part of the daily routine of many wind farm owners and operators. Many details of the condition of their wind farm can only be found there. Are there any defects or faults that need to be remedied? Are there any necessary repairs, servicing and maintenance activities? Standardisation and digitisation save time and reduce errors, particularly for large wind turbine portfolios.

Processing the vast number of documents created and managed during the operation of wind energy turbines can prove quite a challenge. Most licences, invoices, maintenance, repairs and test reports are sent out as hard copies by standard mail or are emailed as PDF files. As these formats all lack interfaces and export functions, the opportunities for processing them effectively and efficiently are very limited. Before experts can analyse the data in these documents, prioritise activities and initiate work to be performed on the turbine, they often have to laboriously export the documents to other EDP systems and convert them into other file formats e.g. Excel.

The information needed for operation is thus rarely centrally administered, but instead is spread across various file folders, email attachments, Excel spreadsheets and EDP systems. This has resulted in complex, carefully coordinated documentation processes to keep an eye on the plant's current condition and any relevant deadlines and work that need to be performed.

The opportunities offered by digitisation

As outlined above, stakeholders have hardly scratched the surface of the benefits of standardised and digitised information processing as yet. This also applies to analysis of data from the test reports of periodic inspections of wind energy turbines. The regular inspections performed by authorised experts and their records are particularly useful for providing wind farm managers with important information about their turbines' conditions. Are the foundations of the tower in good order and its stability ensured? Have lightning strikes caused defects in the wind turbine's system? Do aircraft warning lights and other safety devices function reliably? All test reports include such information, plus the actions and deadlines that wind farm owners must take and observe to eliminate problems such as safety-relevant defects.

However, conventional documentation quickly reaches its limits. The management of many large wind turbine portfolios often focusses on concerns other than the contents of test reports. For example, do frequent failures of air-warning lights really result from lightning strikes, or could they have been caused by a series fault? Given that defective gearboxes have resulted in

costly shutdowns in the past, does precautionary replacement of gearbox components make good economic sense? Documentation on paper, in PDF files and Excel spreadsheets sometimes makes it difficult to even identify increased rates of failure of important components, not to mention using them to draw further conclusions.

Test reports 4.0

To move test reports of periodic wind turbine inspections to the next level of our digital age, TÜV SÜD Industrie Service has now improved its existing proprietary software, offering wind farm owners and operators efficient fault analysis and supporting them in faster remediation of existing defects in wind turbines and prevention of future damage. Combined with intelligent service parts planning and servicing, for example, this method contributes to reducing downtime.

Another advantage of the new software concerns standardisation during inspection. Experts frequently use various synonyms, spellings or abbreviations for one and the same component, which may be a source of inaccuracy and confusion.



Germany has 25,000 onshore wind turbines, which must be inspected every two years. During inspection, a remote-controlled drone equipped with a camera delivers high-resolution photos, thus permitting full documentation of the inspection.

The fact that most system boundaries are not clear-cut makes the exact localisation of the fault even harder – for example, if an expert diagnoses a ‘fault in the gearbox’ but fails to provide exact information on its location. Last but not least, faults are frequently described in different ways and the inspection results entered in own web-based databases, where customers can then inspect and analyse their own turbine portfolio. Different descriptions can therefore frequently cause system-related interactions, in plant conditions, to go unnoticed.

Software-based use of standardised terminology

The wind energy industry has been aware of this terminology problem for some time. Initial standardisation projects have already been launched, designed to prevent

misunderstandings and improve transparency. The European technical association for power and heat generation, VBG, has transferred an international designation system to wind turbines by applying Part 32 of the “Reference Designation System for Power Plants” (RDS-PP). This system assigns each component a unique individual code based on its location of installation and its function e.g. MDL 10 for azimuth motors. Similar to GPS coordinates in a navigation system, this code ensures beyond all doubt that all stakeholders refer to the same component at exactly the same location. The stakeholders’ agreement to use this common code has enormously facilitated system-related ‘navigation’.

Ideally, experts use portable IT devices, e.g. tablets or mobile phones, to document the code and description of a fault directly

on site. TÜV SÜD Industrie Service has developed a new software module for this purpose. The module uses the RDS-PP codes for wind turbines and is an add-on to the netDocX electronic logbook. The web-based ‘folder’ is available online and has proved its worth for years in the digital documentation of conventional test reports.

In periodic inspections, the wind experts at TÜV SÜD Industrie Service now enter the component’s location of installation in several dimensions and its standard name (e.g. ‘azimuth motor’). The software then assigns the component a code based on RDS-PP. The information is systematically recorded and saved in a database that offers automated processing and easy analysis. Wind farm owners and operators can access both the database, with full inspection data, and the regular test reports in PDF format. Bearing in mind that even



TÜV SÜD is continuously expanding its services in the field of renewable sources of energy. The international service provider considers wind power and photovoltaics to offer the largest growth opportunities.

minor inspections may result in hundreds of test reports, the additional database makes all the difference; instead of ploughing through 200 PDF documents, data analysis can now be performed in a database requiring only a few mouse-clicks. This minimises turbine shutdowns and provides turbine owners and operators with clear information about their plants and systems. The new software not only enables repairs to be initiated more quickly. Its improved data analysis helps to identify system-related interactions (e.g. serial faults) and derive preventative measures therefrom.

Database analysis of defects

All actual defects can be presented in a clear and precise manner and analysed as needed e.g. by most frequent defect, or defect statistics by manufacturer and region. The operators and owners of wind

turbines can then use these results to prepare informative statistics and derive forecasts for the entire life cycle of a wind turbine, collected in a single digital file. This standardised overarching recording not only improves the position with regard to data and data quality, but also facilitates data management with the help of IT systems. Furthermore, it highlights areas in which availability may be improved and costs saved: serial faults can be identified faster, reminders for correction of defects created and the costs of types of defects quantified. This may impact favourably on insurance conditions.

Improved administration and coordination will ensure more reliability and budget transparency overall. TÜV SÜD's web-based database, netDocX, ensures well-structured retention of all test reports, which can also be retrieved at any time.

Reports of all necessary wind turbine inspections can also be entered in netDocX, enabling the creation of a genuine lifecycle file. By using these files, owners and managers ensure that they are well informed about their wind turbines in the field at all times. ■

□ www.tuev-sued.de/windenergie
TÜV SÜD Industrie Service GmbH
Wind Cert Services
Ludwig-Eckert-Str. 8
93049 Regensburg, Germany
Tel: +49 (0) 941 460212-20
Email: thomas.arnold@tuev-sued.de