Laboratory for Wind Turbine Testing
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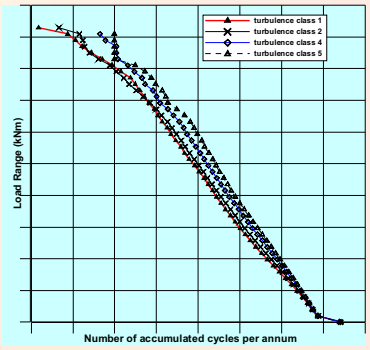
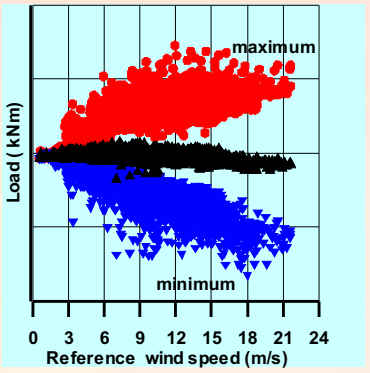
LOAD MEASUREMENTS ON WIND TURBINES



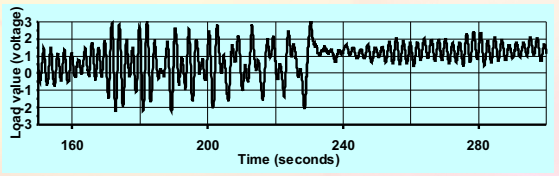
Exposed to difficult climatic and wind conditions, a wind turbine may experience considerable extreme and fatigue loading events. The information obtained from a load measurement campaign supports the optimisation of a wind turbine model (low cost, greater life expectancy, safety) and supplements the documentation required for the type-approval of prototypes. Specialised measuring campaigns can also help in the investigation of problems on operating wind turbines.

Load measurements require highly-skilled, competent staff involved from the preparation and design of the measurement system up to the analysis and final reporting. Strain gages and accelerometers are installed on the wind turbine blades, shaft(s) and tower. The Laboratory for Wind Turbine Testing (LWTT) of CRES offers a complete package of load measurements in accordance with IEC-TS61400-13. The instrumentation used complies with IEC-61400-12 requirements offering the possibility of a simultaneous power performance testing. Meteorological, load and wind turbine operational sensors are integrated in a compact, mobile unit. Turn-key installation is always offered.



The data acquisition system (CRESDAQ ©software) enables continuous or trigger-specific data storage, different sampling rates per channel, real time and off-line review of recorded data and power spectra evaluation. Raw data are stored and daily statistics are transmitted for preliminary evaluation through GSM-modems. LWTT closely cooperates with the customer to ensure fast consideration of the wind turbine performance.

A detailed, comprehensive report provides typical time series for every type of event and mode of operation, scatter-plots of meteorological, operational and load parameters, power and fatigue spectra, azimuth load variation, equivalent load scatter-plots vs. wind speed and turbulence intensity, construction of mean and equivalent load curves, calculation of composed lifetime fatigue spectra for prescribed duty cycles and different turbulence levels, thorough uncertainty analysis. Within MEASNET, of which LWTT is founding member, LWTT participates in the round-robin tests for load measurements . Participating in major EU research projects, LWTT has acquired valuable experience in monitoring wind turbine loading in complex terrain and was deeply involved in defining recommendations for load measurements and analysis within IEC. Besides load measurements for research purposes, LWTT has issued several type-certification load measurement reports for European wind turbine manufacturers.



LWTT **is accredited by the DAP** (Deutsches Akkreditierungssystem Pruefwesen) according to **DIN-EN ISO/IEC 17025:2000**. The accreditation scope includes loads measurements on wind turbines.

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Accredited by the DAP (Deutsches Akkreditierungssystem Pruefwesen GmbH)
as a Testing Laboratory according to DIN EN ISO/IEC 17025:2000
DAP-PL-3266.00

Published by CRES Liaison Office