

## FULL SCALE WIND TURBINE BLADE TESTING

Blades are the most crucial parts in a wind turbine. The aerodynamic characteristics of a wind turbine's blades determine its power performance. Their structural strength determines its life expectancy. **Wind turbine blades** are exposed to **stochastic aerodynamic loading**. The complexity of the load carrying capabilities of **composite materials** adds further to the problems faced by a wind turbine blade designer. **Full scale testing** of a wind turbine blade prototype is critical for the successful development of wind turbine blade production line.

**The Blade Testing Department** of The Laboratory for Wind Turbine Testing of CRES can accommodate blades up to 20m long. Through the use of computer-controlled hydraulic actuators the following full-scale tests are performed:

- **MODAL**
- **STATIC**
- **FATIGUE**

Strains, deflections, inclinations and accelerations exhibited by the blade, imposed loading and environmental conditions are monitored during each testing to define blade's performance.

The **Laboratory for Wind Turbine Testing** of CRES is **accredited** by the DAP (Deutsches Akkreditierungssystem Pruefwesen) as a Testing Laboratory according to **DIN EN ISO/IEC 17025:2000**. The accreditation scope of the Laboratory includes full-scale wind turbine blade static and modal testing.

**The Blade Testing Department** has the following equipment available:

- Hydraulic power supply of 360 l/min capacity at 210bar
- 4 Hydraulic Cylinders of various capacities ( $\pm 25\text{kN}$ -500mm,  $\pm 100\text{kN}$ -1500mm) for **static** and **dynamic** loading
- 2 Hydraulic Cylinders of 100kN, 2000mm for static loading
- $\pm 250\text{kN}$  **Coupon testing** machine for static and dynamic Loading
- 64 channels acquisition system
- LVDTs, Inclinometers, Accelerometers
- 10 channel Acoustic Emission system
- Ultrasonic system for composite material structures
- 3D digitiser for quality control of the blade's geometry

