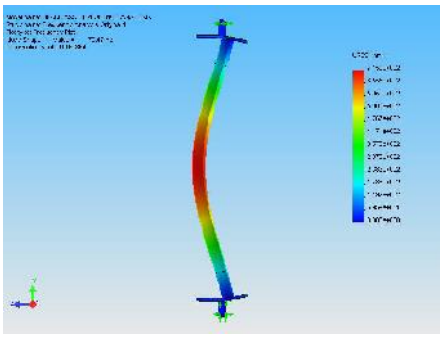
Case Study

Vertical Axis Wind Turbine Prototype Test Rig

Description

The Vertical Axis Wind Turbine (VAWT) test prototype was designed and manufactured to validate the aerodynamic design of a new wind turbine. The design resulted from CFD work, based on a scaled down 2 m device that would potentially suit various existing wind tunnels.



Blade Vibration Analysis

The VAWT prototype consisted of a static framework, housing and rotor with variable geometry blading. Rotational speed was controlled via a brake system, with speed, torque and pressure measurement being acquired via a data acquisition system. Video was also incorporated for specific parts of the test. Following final assembly, the prototype was then installed, commissioned and tested in the full size MIRA wind tunnel.

Specification Summary

- Single stage 2 m scaled turbine rotor
- Variable blade pitch angel design
- Wind speed test range = 5 - 20 m/s
- Variable yaw angle testing
- Aluminium rotors, steel shafts, GFRP blades
- VAWT rotor mounted in mid-tunnel position with torque transducer & air cooled brake below
- Inlet, interstage & outlet total & static pressure instrumentation
- Wind tunnel & LabVIEW data acquisition

VAWT During Testing

Disciplines Used

- Conceptual & mechanical design, fluid mechanics analysis, rotordynamics analysis, stress & vibration FEA , LabVIEW data acquisition, project management, manufacture, assembly, test & commissioning.