

# Wind Turbine Emulator system (WTE)

Wind turbine emulator mimics the behavior of wind turbine for hardware level simulations. This system has a DC motor coupled with the Induction generator, speed of which is controlled as per the speed reference calculated by solving the mathematical model of wind turbine. An induction generator is coupled to the DC motor and bidirectional inverter is connected to the terminals of the generator. Researcher can execute the mathematical models of their newly developed or modified wind turbine and can simulate the speed/power and profile of turbine on hardware environment directly for different wind speeds & pitch angle.

## Design

Scalable Design

## Usability

Can be used indoors only

## Specifications

1kW Wind Turbine Emulator  
Standalone/ Grid Connected  
system





## Features

- Capable of demonstrating the behaviour of up to 1kW wind turbine (i.e. power V/s wind speed behaviour, turbine torque V/S turbine speed behaviour) for any feasible sudden change in wind speed and direction in real time.
- Exhibits both static and dynamic behaviour close to real wind turbine.
- Intuitive graphical user interface & data acquisition for control and monitoring of various parameters.
- Capability to change the wind turbine parameters (within permissible range).
- FPGA board for solving the differential equations in real time, additionally on board ADC channels and PWM port for power electronics converter/inverter firing.
- Suitable for Hardware-in-Loop simulations.
- External control of inverter is possible
- 3 phase inverter control for standalone and grid tied system in Wind Emulator
- Sensor board senses the rectifier DC-Link voltage, three-phase ac voltages and currents.
- Power Balancing using battery bank and bidirectional converter