

VISVESVARAYA TECHNOLOGICAL UNIVERSITY
BELGAUM-590 002



A Project Report on

**“WIND STRESS MONITORING ON THE BLADES
OF WTG AND ITS LIFE ASSESSMENT”**

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ABSTRACT

In the present scenario, demand for electrical energy is increasing at an exponential rate. Electrical energy from conventional sources such as water, fossil fuels and nuclear fuels unable to meet the load demand and are depleting day-by-day. So, electrical energy from renewable sources such as wind, sunlight, biomass, biogas, geothermal etc. is emerging. Wind power generation is prominent among them. But it is not reliable because of wind intermittency and higher maintenance of wind blades and gears of WTG. Wind blades are subjected to continuous stress due to wind pressure. This will reduce the life time of the blades. In the project, wind stress on the blade is continuously monitored and data is stored for manipulating and processing. From this stored data, life time of the blades is assessed using the empirical formulas suggested in the literature.

The project consists of two sections. In the first section, wind stress monitoring on the blades of WTG. In order to monitor the pressure impacting on the blades of a WTG, Electret Microphone is used. This will sense the acoustic signals (pressure) which is then converted into electrical signals. This electrical signal is then converted into digital counts using pic microcontroller 16F877A which consists of inbuilt analog to digital converter. Then it is displayed in the 16 character * 2 lines LCD display. As well as the same digital count is then transmitted through UART (full duplex) using MAX232 and RS232 to the processing unit.

In second section, the life assessment of blades of WTG. Usually the blades are designed for infinite cycle (10^6 cycles) for a particular years. If the pressure value increased above the ultimate tensile pressure of the material there is failure of material. In the project, in order to assess the life, visual C++ programming language is used. Visual C++ is coded according to the requirement of project. The digital values are collected from RS232. Then the mean value is calculated and compared with the set value. If the mean value is greater than the set value a cycle is counted. Depending upon the infinite cycle, cycle which is counted and specified years the life of the blade is assessed using the formula.

By knowing the fatigue life of blades, wind turbine can be made more competitive. The power generated from the wind turbine is more reliable than the conventional one. The design of blades can be improved. By this analysis decision can made in the operational phases of the wind turbine power plant.