



**SIDDAGANGA INSTITUTE OF TECHNOLOGY**

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**TUMKUR-572103, KARNATAKA, INDIA**

## **Major Project Report**

# **“OPTIMISING THE OUTPUT OF A HORIZONTAL AXIS WIND TURBINE BY PITCH CONTROL, CUSTOM GENERATOR DESIGN AND BLADE STRUCTURE MORPHING”**

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## **ABSTRACT**

The world is at an energy-crisis where the fossil fuels are depleting rapidly and there is a dire need to find alternate sources of energy. The rate of energy demand has increased exponentially during the last decade. Wind power is known to be the most widely used renewable energy source. It is currently responsible for about 1.5% of the world's electricity use. Due to this major reason, it has become important for the world to develop technologies in order to maximise the harnessing of wind power. Keeping this in mind, this project aims at producing electricity for the low wind speed rate of Tumkur. This wind turbine has been specifically localized since the winds at Tumkur usually are at a speed of 3 – 5 m/s. The wind turbine that is being developed is set to rotate at around 125 rpm. The generator rotates due to the constant motion of the blades of the wind turbine. Since the rpm of the blades are going to be low, the speed is increased by the use of a gear mechanism. Since commercially available generators are not suitable for the requirements of the project, the generator has been custom-designed. The generator used in this project is an Axial Flux generator. This is set to run at nearly twice the speed of the blades. The blades are designed in such a way that they have a unique twist, which enables maximum wind to be harnessed when in running condition. The non-uniform alternating current is then rectified to direct current. Due to the variation in running speed of the generator, the direct current obtained is not suitable for use. It is then modified using a buck circuit, into a smooth direct current. This is finally converted into alternating current, appropriate voltage of 230V using power inverters of 1450VA rating and step-up transformers. The output power of the generator is expected to be close to 1.5kW.