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PERFORMANCE ANALYSIS AND MONITORING OF HORIZONTAL AXIS WIND TURBINE USING SOLID WORKS.

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Abstract - *Wind is a clean renewable source for power generation. The aim of the project is to monitor the current and voltage. Solid works based Horizontal Axis Wind Turbine (HAWT) is used to generate 1KW. The purpose of solid works is to sketch 2D or 3D modeling of wind turbine. The shape expels the add or remove the material from the part. The analysis of the project is to perform the cut-in wind speed, rated wind speed, cut out wind speed, survival wind speed, yaw control, over speed control is 2.5 meters/sec,8meters/sec,15 meters/sec, By passive Tail vane and dump Load Control respectively.*

Key Words*: *Renewable source of energy, Monitoring, Output power is 1KW, Solid Works, 3D Modeling.

1. INTRODUCTION

The fast-technological development and energy intensive life styles have resulted in tremendous increase in power requirements. A horizontal axis wind turbine is a dominant design for capturing portion of the power in the wind and converting it into an electrical energy. It is necessary for a wind turbine to have a good startup response to low wind speed to generate 1kW.

Blade is the key component to arrest wind energy. It plays an important role in wind energy. The performance analysis is in need of health monitoring the input voltage, current, power, efficiency and the output power is 1KW with efficiency. Solid works calculates the following outputs pitch control, air foil type, blade radius, blade twist angle and chord. The analysis is used to calculate Wind speed by Anemometer, Turbine speed by speed sensor and also the performance of Rectifier, Inverter, Converter and finally the load is analyzed. The area for installation of Wind turbine is small. The number of blades is three for rotations. A Horizontal Axis Wind Turbine (HAWT) is associated with number of parameter constraints such as length of blade and Withstand Capacity.

1.1 MONITORING

The purpose of monitoring is to analyze the fault and predict maintenance issues so the site operators can conduct repairs and replacement of fault carrying component. Anemometer is used to monitor the wind speed, speed sensor is used to monitor the rotation of the wind turbine, The final voltage and current is monitored by voltage sensor and current sensor with the help of energy meter. It is to admit that the wind produces electricity continuously. It gets interrupted when there is no wind or less wind. So, the load gets supply from the microgrid.

1.2 FAULT ANALYSIS USING SENSORS

Voltage sensor

Voltage sensor senses the voltage from the output of the load. It provides voltage sensing for three phase installation. It is connected in parallel with the load.

Current sensor

Current sensor senses the current consumed by the load and generates a signal proportional to that current. It is connected in series with the load.

2. ANALYSIS

This section presents the design, fabrication and performance analysis of Horizontal Axis Wind Turbine (HAWT). There are many types of Wind Turbine among them some are failed in efficiency because of the higher rotating speed required in other conventional Wind Turbine. Vertical axis Wind Turbine suffers unbalanced torque which causes Vibration. The performance analysis of Horizontal Axis Wind Turbine is operated at low rotating speed without reducing energy efficiency. For performance analysis, Modelling and Vibration analysis of Horizontal Axis Wind Turbine (HAWT), Solid Works software is used.

Table -1: ***Technical data of dia Wind Mill 1KW as per International Electrotechnical Commission-61400-2-SWT***

MODEL	***DIA 1000W***
TYPE	***H A UP-WIND***
Operational data	
Rated power	*1KW*
Cut-in speed	*2.5 meters/sec*
Rated wind turbine	*8 meters/sec*
ROTOR DATA	
No of blades	*3*
Blade Designs	*NACA profiles*
Rotor rated speed	*250 r. p. m.*

Alternator	*Permanent Magnet Variable Power Type*
Peak Power	*1.8KW*
Charge Controller	*3 phase A.C input-24V D.C Output*

MODAL ANALYSIS OF ROTOR SHAFT AND BLADE

It is used to notice the pressure located in the tip of the Rotor's Blade. It was monitored and as applied load during the Shaft Vibrations.

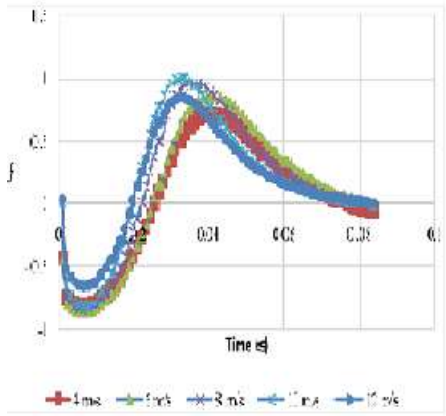

Figure: *Three Bladed HAWT Model*

Energy meter is used to monitor the current, Voltage and Power Consumed by the load. It makes easier for the person who monitors the power consumption that been done by the whole equipment.

The Ac power from the Wind turbine to Rectifier which converts Ac to Dc voltage fed to the Converter. The Converter fed Dc Voltage to the Inverter which then works and converts the Dc voltage in to Ac voltage. The final output from the Inverter is supplied to the load

3D model design of the wind turbin using solidworks

3. CONCLUSION

This paper concludes by presenting the 3D modelling of Horizontal Axis Wind Turbine (HAWT) and computer aided design of a Wind Turbine by Solid works. The Horizontal Axis Wind Turbine of the Rotor performance is 1 KW. The proposed system is used to analyze the parameters as voltage, current, power, efficiency, speed in Generator, Rectifier, Converter and Inverter. The reliability of generating power is more. The 3D model software is to create, Simulate, publish and manage the date of Wind Turbine

4. REFERENCES

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