Design and Fabrication of Power Generation by Combined Wind and Tidal Turbine

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ABSTRACT

We have given an overview of wind and tidal power generation method. Wind generation is now an established large global business while tidal generation is still in prototype stage of development. The most important parameter for commercial acceptance of these technologies is LOCE (levelized cost of electricity) produced by them. We discuss areas necessary for further energy improvement in wind generation. We further discuss the construction, working and application of these energy methods.

Keywords :
Marine renewable energy Combined wave and wind energy, Hybrid Wave energy and Offshore wind turbine.

NOMENCLATURE

The detailed view about the **POWER GENERATION BY COMBINED WIND AND TIDAL TURBINES** and its working principles.

I. INTRODUCTION

In future, renewable energy is used to produce electricity because it has less effect on the environment as compared to non-renewable energy. These alternatives are intended to address concerns about fossil fuels such as its high carbon dioxide emission , an important factor in global warning.

When comparing to the process of producing energy, there remain several fundamental difference between renewable energy and fossil fuels. The process of producing oil, coal or natural gas fuel is difficult and demanding process. That requires a great deal of complex equipment, physical and chemical processes. On the other hand, alternative energy can be widely produced with basic equipment and natural processes.

Marine energy ,hydroelectric ,wind ,geothermal and solar power are all alternative sources of energy.

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II. COMPONENTS

1. BEARING

A bearing is a machine element that constrains relative motion to only the desired motion, and reduces friction between moving parts. The design of the bearing may, for example, provide for free linear movement of the moving part or for free rotation around a fixed axis; or, it may prevent a motion by controlling the vectors of normal forces that bear on the moving parts. Many bearings also facilitate the desired motion as much as possible, such as by minimizing friction. Bearings are classified broadly according to the type of operation, the motions allowed, or to the directions of the loads (forces) applied to the parts.

2. D.C MOTOR

An electric motor is a machine which converts electrical energy to mechanical energy. Its action is based on the principle that when a current-carrying conductor is placed in a magnetic field, it experiences a magnetic force whose direction is given by Fleming's left hand rule.

When a motor is in operation, it develops torque. This torque can produce mechanical rotation. DC motors are also like generators classified into shunt wound or series wound or compound wound motors.

3. WIND BLADES

Flat blades are the oldest blade design and have been used for thousands of years on windmills, but this flat broad shape is becoming less common than other types of blade design. The flat blades push against the wind, and the wind pushes against the blades. The resulting rotation is very slow because the blades that are rotating back on the up stroke after generating power are in opposition to the power output. This is because the blades are acting like huge paddles moving in the wrong direction, pushing against the wind giving them the name of drag-based rotor blades.

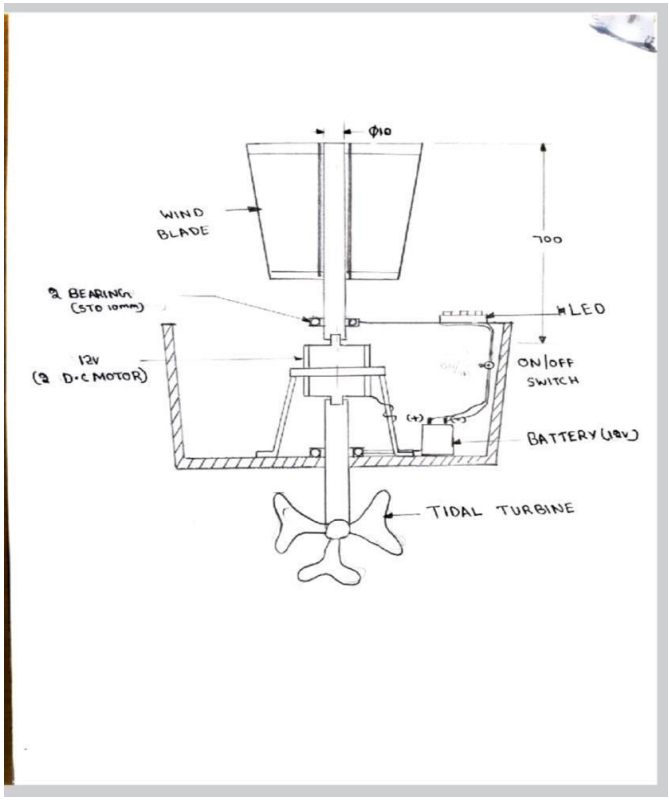
4. FIBRE

The fiber material is used as floating structure in our project. It is light in weight, it has good mechanical properties

5. SHAFT

A drive shaft, driveshaft, driving shaft, tailshaft (Australian English), propeller shaft (prop shaft), or Cardan shaft is a mechanical component for transmitting torque and rotation, usually used to connect other components of a drive train that cannot be connected directly because of distance or the need to allow for relative movement between them.

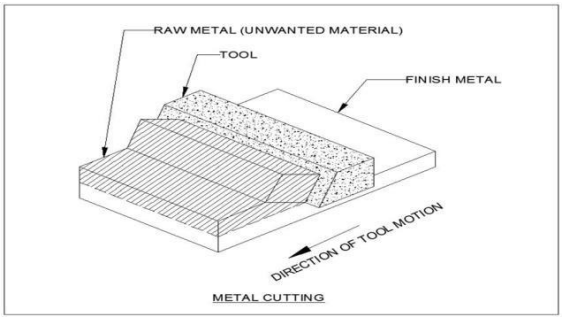
III. DESIGN AND SPECIFICATION



IV. MANUFACTURING PROCESS

1. METAL CUTTING

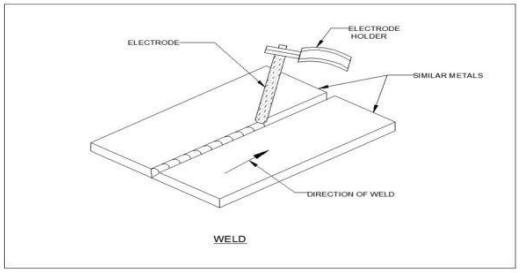
Metal cutting or machining is the process of by removing unwanted material from a block of metal in the form of chips.



Cutting processes work by causing fracture of the material that is processed. Usually, the portion that is fractured away is in small sized pieces, called chips. Common cutting processes include sawing, shaping (or planning), broaching, drilling, grinding, turning and milling. Although the actual machines, tools and processes for cutting look very different from each other, the basic mechanism for causing the fracture can be understood by just a simple model called for orthogonal cutting.

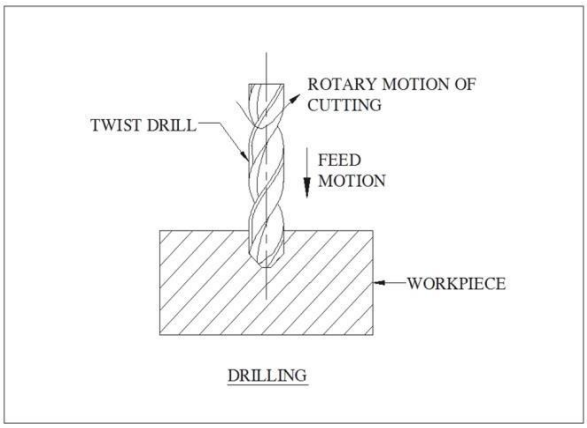
2. WELDING

Welding is a process for joining similar metals. Welding joins metals by melting and fusing 1, the base metals being joined and 2, the filler metal applied. Welding employs pinpointed, localized heat input. Most welding involves ferrous-based metals such as steel and stainless steel. Weld joints are usually stronger than or as strong as the base metals being joined.



3. DRILLING

Drilling is a cutting process that uses a drill bit to cut or enlarge a hole of circular cross-section in solid materials. The drill bit is a rotary cutting tool, often multipoint. The bit is pressed against the work piece and rotated at rates from hundreds to thousands of revolutions per minute. This forces the cutting edge against the work piece, cutting off chips (sward) from the hole as it is drilled.



V. WORKING PRINCIPLE

By Flemings lefts hand rule (since we are talking about the motor) now whenever a current carrying a wire is placed in the magnetic field, it experiences a force.

Suppose initially the current was downwards and the field was from left to right, the conductor would experience a force towards the observer. Now if I change the direction the field, then the direction of force also reverse is now away from the observer. Hence by changing the field terminals you change the direction of field but keeping the direction of armature same hence changing the direction of rotation.

The shaft of wind and tidal source were connected to the motor, when the motor rotates, the power will be generated. The power generated by both wind and tidal were stored and utilized if it is required.

From this expression;
Torque =k*(flux)*armature current.

where ‘k’ is a constant.
So, reversing either flux or armature current would lead to reversal of torque and change the direction of rotation.

VI. COST ESTIMATION

S.NO	MATERIALS	QUANTITY	COST IN RS
1	DC MOTOR AND BEARING	1	1800
2	STEEL	1	400
3	WELDING	1	600
4	SHAFT	1	200
5	ALUMINIUM PLATE	1	200
6	FIBER		250
7	BATTERY	1	300
8	BUCK BOOSTER	1	150
9	LED	1	50
10	WIRE	1	50
TOTAL			4000

VII. PHOTOGRAPY

VIII. MERITS

- It is an inexhaustible source of energy.
- Tidal energy is environment friendly energy and doesn't produce greenhouse gases.
- As 71% of Earth's surface is covered by water, there is scope to generate this energy on large scale.
- We can predict the rise and fall of tides as they follow cyclic fashion.
- Efficiency of tidal power is far greater as compared to coal, solar or wind energy. Its efficiency is around 80%.

IX. DEMERITS

- Cost of construction of tidal power plant is high.
- There are very few ideal locations for construction of plant and they too are localized to coastal regions only.
- Technological advancements are required to make it commercially viable.

X. FUTURE SCOPE

India is facing an acute energy scarcity which is hampering its industrial growth and economic progress. Setting up of new power plants is inevitably dependent on import of highly volatile fossil fuels. Thus, it is essential to tackle the energy crisis through judicious utilization of abundant the renewable energy resources, such as biomass energy, solar energy, wind energy and geothermal energy. Apart from augmenting the energy supply, renewable resources will help India in mitigating climate change. India is heavily dependent on fossil fuels for its energy needs. Most of the power generation is carried out by coal and mineral oil-based power plants which contribute heavily to greenhouse gases emission.

The average per capita consumption of energy in India is around 500 W, which is much lower than that of developed countries like USA, Europe, Australia, Japan etc. However, this figure is expected to rise sharply due to high economic growth and rapid industrialization. The consumption of electricity is growing on the worldwide basis. Energy is a necessity and sustainable renewable energy is a vital link in industrialization and development of India. A transition from conventional energy systems to those based on renewable resources is necessary to meet the ever-increasing demand for energy and to address environmental concerns.

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