UNDERWATER WINDMILL

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I.ABSTRACT:

Windmills are usually used to extract power from wind energy. Underwater windmills are used to extract energy from the water flow of oceans. Underwater windmills can also be called as Tidal stream turbines. They use kinetic energy of the moving water as wind blades use moving air. The principal of an underwater windmill is same as the usual windmill. A set of blades creating electrical energy converted from mechanical energy moved with the help of aqueous fluent of water. Tides are used to throw water against slanting blades and make them spin. Ocean has different currents at different depths. It was published in the article that near the seabed neither the whirlpools are consequent current passes in the contrary direction. Towers can be built to extract power for such cases. Protection of sea life is also important. Due to the considerable amount of solid over air underwater windmill has slow rotation. Windmills can be put in the river superior ocean currents. It is coated with Teflon or other slippery material.

II.KEYWORDS:

Tidal stream turbines, water flow of ocean, horizontal axis turbine, vertical axis turbine, SEAGEN project.

III.INTRODUCTION:

Now a days, Renewable energy generation is growing rapidly due to the dual issues of continuing global warming and national security of electrical supply. A largely unused potential with global potential to supply 170 TW of electricity annually resource is by ocean energy. Because of sufficient numbers of such fast-flowing underwater currents around the world to make this form of marine renewable energy worth to be harnessed. Tidal stream turbines are described as underwater windmills. They are driven by the kinetic energy of moving water as same as the way that wind turbines rotate by moving air. The generator is placed into a marine current that typically results when water being moved by tidal forces. Tidal stream turbine can majorly help in production the energy.

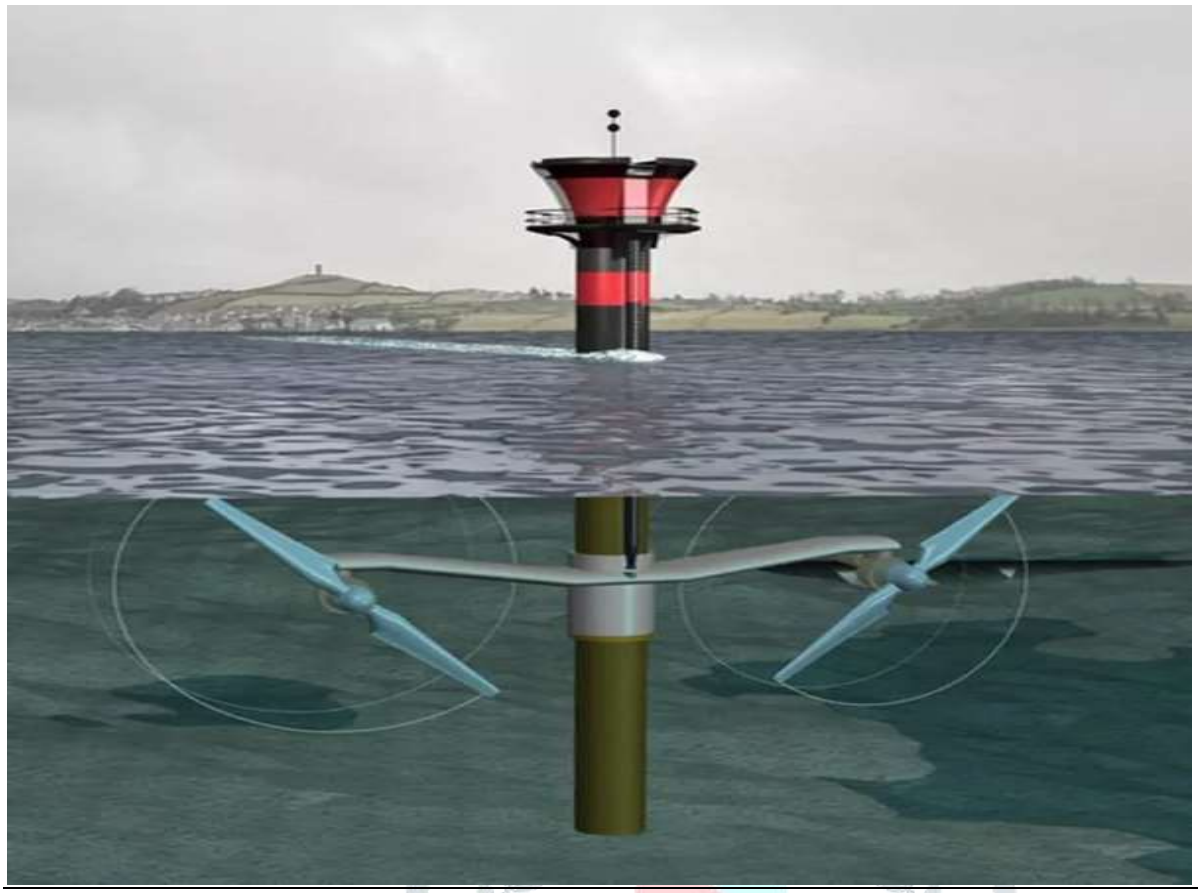


FIGURE.1

IV.HISTORY

0n Monday, the first offshore tidal stream turbine was installed by researchers. The rotor rotates by the power of the tides to generate electricity on the English coast. At beginning: The first "farm" of tidal turbines could grow up the English coast within years. Placing a windmill, turning it on its side and submerged in the ocean is worth remarkable. The effect what is done by engineers in the Bristol Channel in England. The aim is to harness the energy where the tide produces day in, day out. The world's first prototype tidal energy turbine was launched on Monday. The "Sea flow" installation was built into the ground under the sea about one and a half kilometers (one mile) off the Devon coast. Only a white and red-striped tower is made visible above the surface. Beneath, 20 meters down, the single 11-meter-long rotor turns up to 17and half times a minute at a maximum speed of 12 meters per second, drawing energy from the water.

V.TIDAL LEVEL:

The regular rise and fall of the water level of the ocean is mainly caused by gravitational and centrifugal forces which are a result of the presence of the Earth to the Moon and the Sun. When the water flows towards the shore it is called a flood tide while the subside water is called the ebb tide. This occurs on at least a daily basis in all areas of the world and in coastal areas especially northwest Europe the tide exhibits strongly semi-diurnal (twice daily) behavior. High tide on earth occurs "in line" with the Moon and conversely low tide occurs at +/−90° relative to the Moon. When the Earth, Moon and Sun system are in alignment the gravitational effects of the Moon and Sun are combined to form a high tidal range. when the Moon and Sun are at 90˚ to one another, as viewed from Earth, the gravitational effects of the Moon are prevented by the Sun, leading to an exceptionally low tidal range

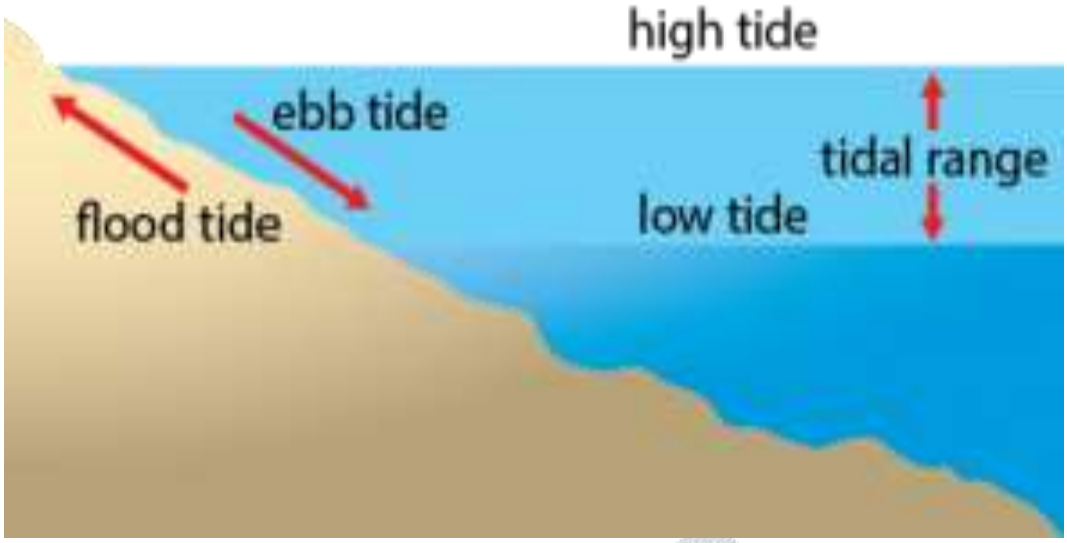
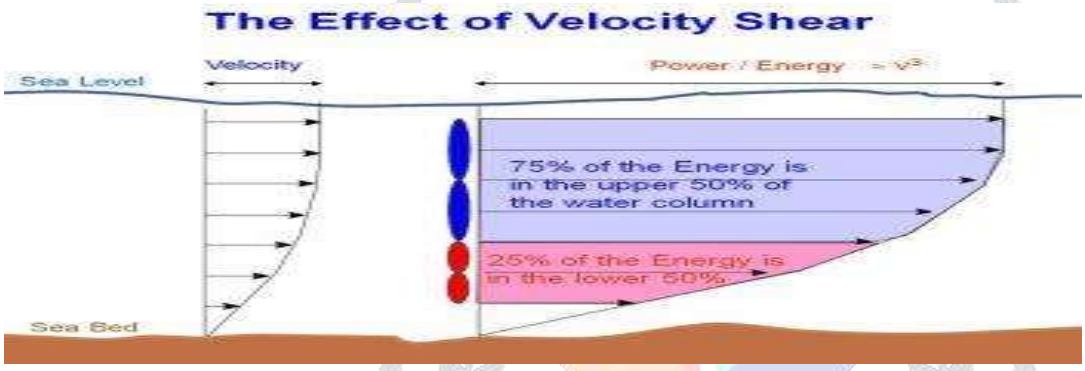


FIGURE 2



VI. PRINCIPLE:

A set of blades rotated by the flow of water creates mechanical energy which is then converted to electrical energy. They are equitably exasperating for eco-activist, as wind turbines interrupt bird flights just as water turbines can disturb underwater life. One advantage of a water turbine over other sources of renewable energy is a predictable tide table. Ocean energy devices work on the similar principle as a windmill, where large underwater rotors, propellers are driven by the huge mass of flowing water to be found at definite places in the sea. It's the technology where rotors mounted on steel piles (tubular steel columns) are set into a socket drilled in the underground. The rotors are driven by the flow of water in the same way where the windmill rotors are driven by the wind. The main difference is that the water is more than 800 times as dense as air, so utter slow velocities in water will generatesignificant amounts of power. The energy generated, being derived from tides, has the added predictable significant advantage.

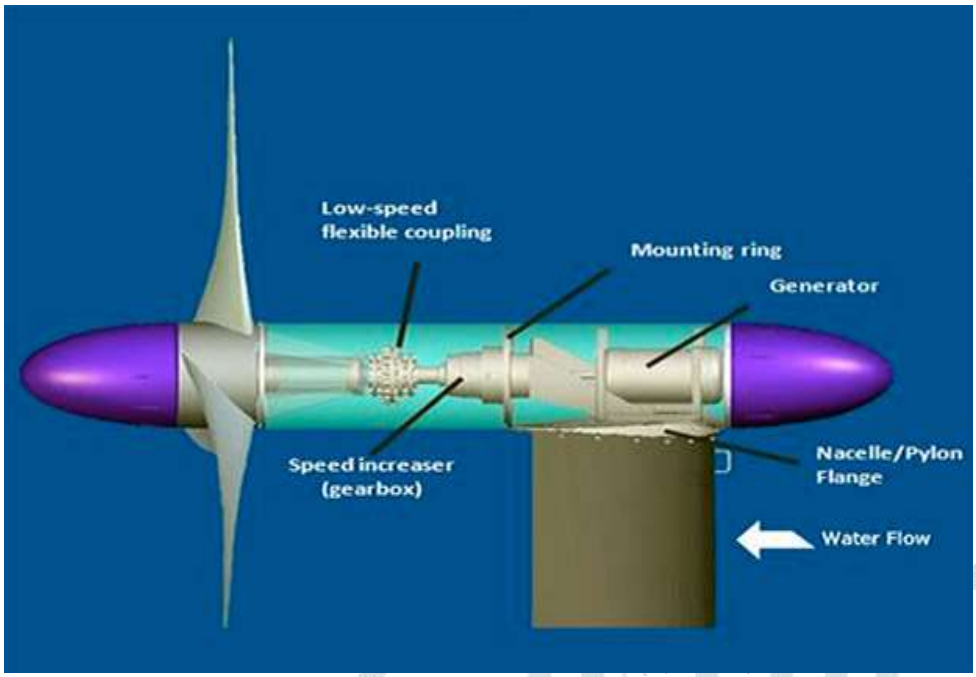


FIGURE 3

A. How Do Underwater Turbines Work?

Underwater turbines work as similar as usual. Three bladed rotors are placed on a vertical stack and it is moved by the motion of the water. The rotor rotates a magnetic coil generator in the shaft housing which creates an electrical current. The high velocity of water generates more electricity. The underwater turbines are draft to work with water flow from either the front or the back. This allows to take back-and-forth motion of tidal wave systems.In contrast to wind turbines, underwater turbines can predict the amount of electricity. Water flow rates are comparabaly stable from one day to the next day. Thís makes it easy to predict the amount of electricity that will be generated.

B.TYPES OF TURBINE AND INSTALLATION:

Three fundamental types of turbine are

- Horizontal axis systems were installed in the Bristol Channel between England and Wales, Hammerfest Strom, in Norway.

-Vertical axis systems were installed in the Strait of Messina between Sicily and the Italian mainland.

- Variable foil systems were installed in Yell Sound in Shetland, which lies to the North of Scotland and Orkney.

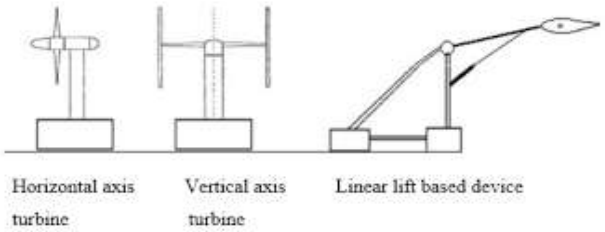


FIGURE .4

C.MAIN PARTS:

•TURBINE

•GEAR BOX

•GENERATOR

•CABLES

•SUPPORT

V. POWER GENERATION BY UNDERWATER WINDMILL:

Power Generation by Underwater Windmill and Energy derived from the moon now flows into an Artic tip of Norway via a novel underwater windmill like device powered by the rhythmic overflow of the tides. The tidal turbine passes through the floor of the Kvalsund channel and is connected to the nearby town of Hammerfest's power grid on September 20th. This is the first time in the world that the electricity directly from a tidal current feeds into a power grid. The gravitational pulling force of the moon produces an instant tidal current that causes the channel at about 8 feet (2.5 meters) per second and spins 33-foot (10 meters) long blades of the turbine. The blades automatically turn and rotate at a pace of seven revolutions per minute. It is sufficient to produce 700,000 kilowatt hours of non-polluting energy per year. It's enough to power about 35 Norwegian homes (70 U.S homes

FIGURE.5

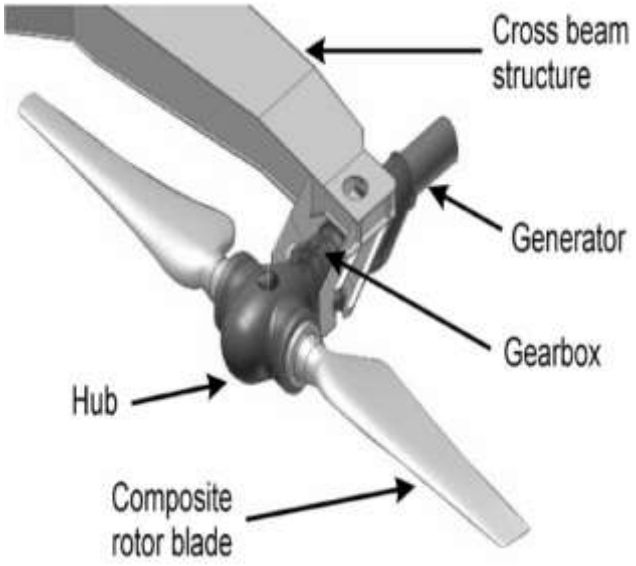


FIGURE.6

VI.SEAGEN PROJECT:

FIGURE.7

Sea gen was the world's first large scale commercial tidal stream generator. Sea flow proved technically feasible, Seagen is needed to prove the economic and commercial feasibility. The Seagen system has its rotors mounted at the outer ends of a pair of streamlined wing-like arms projecting either side of the supporting pile. The rotor diameter is 16m. It drives a 600 kW power-train composed of a gearbox and generator. Depending upon the siting condition, 1200 kW(e) is the total rated power of each installed. The reasons for the twin rotor configuration are primarily that this permits bidirectional operation with the rotors clear of the pile wake when the rotors are downstream of the pile; 1808 rotor blade pitch control allows efficient operation when the current reverses. Two rotors can clearly deliver twice as much energy as one would, but at less than twice the cost, so there will be the cost effectiveness. Essentially, Seagen produces three times the power of Sea flow at around twice the Cost-effectiveness. It generates 1.2 MW approximately 20 hours per day even though the tides are forced in and out of Strang ford Lough through the Narrows Seagen is a £10 million project. It is also supported by new shareholders of MCT and strategic partners, EDF Energy (the UK subsidiary of one of the largest utilities in the world– Electricite´ de France), by Guernsey Electricity (the Channel Island utility which happens to have strong currents around its coast), and by Bank Invest (a Danish specialist investment bank focusing on innovative and clean-energy technologies). The UK government, through the DTI, is again supporting MCT's R&D, having committedto provide a grant worth £4.3 million

FIGURE.8

VII.REASEARCH&DEVELOPMENT:

Research & Development of Underwater Windmill Advances in a number of other sectors have benefited the marine renewable industry sector including advanced materials, turbine design, and offshore construction.

FIGURE.9

VIII.ENVIRONMENTAL IMPACTS:

•increased noise levels

• risk of collisions

•changes to benthic and oceanic habitats

• alterations to food webs

• pollution from increased sailing traffic

• release of contaminants from ocean floor sediments.

FIGURE .10

IX.MAINTAINENCE DURING UNDERWATER GUNWINDMILL:

•When the device is submerged in fast currents maintenance will be challenging and expensive. ,

•So, the gear box and generator will be lifted above the surface.

•Once raised, any maintenance or repairs can readily be carried out from the structure attended by a surface vessel

FIGURE.11

X.ADVANTAGES:

•There are no fuel costs.

•The initial construction costs are high; but the overall maintenance is affordable.

Other than renewable resources such as wind power, the ebb and flow of the ocean tides are entirely predictable and consistent and aren't affected by outside forces such as the weather.

•Tidal energy produces no emissions.

•Energy output is a 100 % authentic, as tides are as sure as the moon.

•Hidden directly underneath the water.

• Tidal energy independent on oil reserves from other countries.

• Reduce the depends upon fossil fuel.

XI.DISADVANTAGES:

• Off shore turbine expense more than wind turbine.

•Due to underwater function, it expenses more.

•Because of salt content, there will be corrosion to steel.

• Fishing has to be restricted in the areas of the power plant.

•Damages habitat up to 500km away.

•Construction under water is difficult.

•Noise abatement.

XII.Conclusion:

•The importance of renewable energy is essential nowadays.

•In the underwater windmill, the upcoming projects are under construction due to its predictability of generating power.

•Tides play a very important role in the formation of global climate as well as the ecosystems for ocean habitants

.FIGURE.12

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