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UNDERWATER MILL

Saurabh Shinde[1], Gaurav Dhadod[2], Suraj Sisale[3]

[1]*U.G. Student, Mechanical, J.D.I.E.T. Yavatmal, Maharashtra, India,* ***saurabh.shinde0504@gmail.com***

[2]*U.G. Student, Mechanical, J.D.I.E.T. Yavatmal, Maharashtra, India,* ***gdhadod07@gmail.com***

[3]*U.G. Student, Mechanical, J.D.I.E.T. Yavatmal, Maharashtra, India,* ***surajsisale1998@gmail.com***

Abstract

From ancient time onwards, humans have been dependent on marine propulsion systems for various purposes. As time advanced marine propulsion systems have also undergone various advancements In present scenario, we have a number of marine propulsion systems such as diesel and gas turbine propulsion systems. The major to all these propulsion systems are variable and low efficiencies and less eco-friendly. This presentation transaction with the use of flapping foil propulsion system in ships and underwater vehicles. Flapping foil is a highly flexible polyurethane structure which mimics the prop exercise modes of living beings which were supposed to be more efficient and nature blending. It is found that flapping foil propulsion systems helps in increasing the efficiency and proves to be eco-friendly Keywords: Marine Propulsion, Ship, Underwater Vehicle, Flapping Foil.

The moon's gravitational pull on water bodies creates tides. In turn, this movement creates kinetic energy which is carried by the water. Anything that moves has kinetic energy -- whether it's wind or a ball rolling down a hill. Kinetic energy can be captured by humans through windmills. Researchers are trying to tap into the power of the tides through a design similar to a windmill.

Underwater turbines are a fairly straightforward concept, as far as cutting-edge energy technology goes. They are essentially windmills installed onto an ocean floor or river bed. The underwater current produced by the tides spins blades arranged like an airplane propeller. These turbines are attached to a gear box, which is connected to an electrical generator. This produces the electricity that is carried by cable. Once it's plugged into an electrical grid, the electricity can be distributed.

Index Terms: *tides ,turbine , etc.*

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1. UNDER WATER MILL

Tidal stream turbines are often described as underwater windmills. They are worked by the kinetic energy of moving water as wind turbines use moving air. The generator is placed into a marine current that results when water being moved by tidal forces comes up against, an obstacle or through a constriction such as a passage between two masses of land. There are enough numbers of such a fast-flowing underwater currents around the world to make this form of marine renewable energy worth pursuing. Harnessing the marine currents could also help fulfil the Climate Change Committee's recent request in 2010 that calls for an almost complete decarbonisation of the UK's electricity supply by 2030. In their report, Future Marine Energy, published in 2006, the Carbon Trust appraisal that tidal stream energy could meet 5% of the UK's electrical energy needs, reducing the country's dependence upon carbon intensive imported fossil fuels. Other studies have predicted that tidal generators could produce up to 10% of the UK's electrical energy needs. A point not lost on the UK government and the devolved administrations who see the industrial growth opportunities that tidal and wave energy could offer. Tidal flows have the advantage of being as predictable as the tides that cause them; both in terms of timing and in judging their maximum velocity. This long-term predictability helps greatly in electricity generation, enabling more efficient grid management. Thus, reducing the total amount of power which needs to be generated.

1.1 Principle of Operation and Description

Seagen has operated reliably with mostly minor glitches of the kind to be expected with any new technology of this complicacy. Most down time has been as a result of either minor component failures of the kind familiar to the offshore wind industry or to special tests being carried out to determine the systems performance, both in terms of productivity and in terms of structural integrity

1.2 Construction

There are three factors that govern the energy capture by any water current kinetic energy converter: the swept area of the rotor(s); the speed of the flow (kinetic energy is proportional to the velocity cubed) and the overall efficiency of the system. There have been many challenges to make tidal turbines commercially viable, among these has been the need to place the systems in the right locations where the water depth, current flow patterns and distance to the grid make a project economically viable, and to make units efficient and easy to maintain. Perhaps the greatest challenge relates to creating an underwater structure with foundations capable of withstanding extremely hostile conditions. The drag from a 4.5 m/s current such as MCT's SeaGen experiences at the peak of a spring tide at Strangford is equivalent to designing a wind turbine to survive wind speeds of 400 km/h (250 mph).MCT's most recent turbine installation is located in Strangford Narrows, Northern Ireland. Known as 'SeaGen', it became operational in 2008 using twin 16 m diameter rotors each sweeping over 200 m2 of flow that develop a rated power of 1.2 MW at a current velocity of 2.4 m/s. It is accredited by Of gem as a UK power station and is largest and most powerful water current turbine in the world, bya significant margin, with the capacity to deliver about 10 MWh per tide, adding up to 6,000 MWh a year. Its distinctive shape and functions have been developed by years of trials of locating and operating underwater systems

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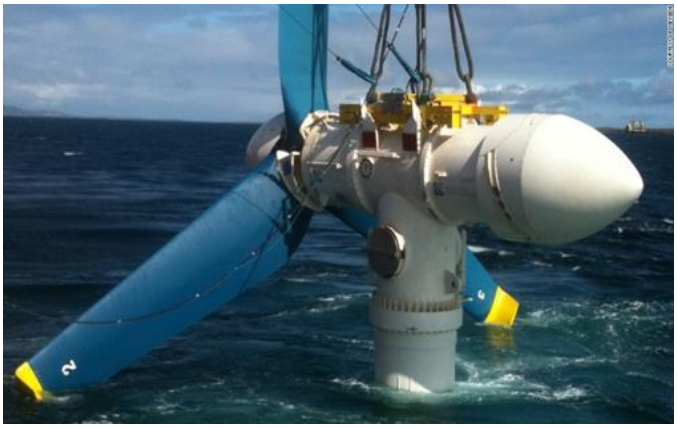

Fig-1: Underwater Mill Blade

Fig-2: Turbine

2. WORKING

Underwater turbines rely on tides to push water against angled blades, causing them to spin. These turbines can be placed in natural bodies of water, such as harbors and lagoons that naturally feature fast-moving flows of water. These turbines must be able to swivel 180 degrees to arrange the ebb and flow of tides, as per demonstrated by the SeaGen prototype turbine in Ireland. As the blades spin, a gearbox turns an induction generator, which produces an electric current. Other devices can be tethered and attached to a float, such as the Evopod in England. This design allows the face of the turbine to always face the direction of the current, much like a moored boat does.

Many wave power machines are designed to capture the energy of the wave's motions through a bobbing buoy-like device. Another approach is a Pelamis wave generator, now being tested in Scotland and in Portugal, which transfers the motion of surface waves to a hydraulic pump connected to a generator.

Tidal power typically uses underwater spinning blades to turn a generator, similar to how a wind turbine works. Because water is far more dense than air, spinning blades can potentially be more productive than off-shore wind turbines for the same amount of space.

In addition to being renewable, another key advantage of ocean power is that it's reliable and predictable, said Daniel Englander, an analyst at Green tech Media.

Although they can't generate power on-demand like a coal-fired plant, the tides and wave movements are well understood, giving planners a good idea of energy production over the course of year.

There are only a few underwater turbines in operation today and they all operate like underwater windmills, with their blades turning at right angles to the flow of the water. In contrast, the Oxford team's device is built around a cylindrical rotor, which rolls around its long axis as the tide ebbs and flows. It can use more of the incoming water than a standard underwater windmill.

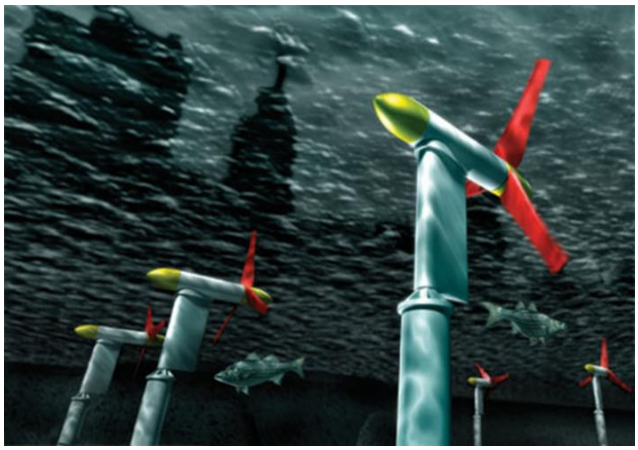

Fig-3: View of Underwater Mill

3. ADVANTAGES AND DISADVANTAGES OF UNDERWATER WINDMILL

3.1 Advantage

- One of the most important benefits of using the power of the tides is that there are no fuel costs. The energy is fueled by the reliable and sustainable force of the ocean. The initial construction costs are high, the overall maintenance of the equipment and the return of power in the form of electricity can help offset this cost.
- Tidal power is also an emission free source of power, providing clean energy by harnessing this natural resource. It can replace other electricity-producing methods that rely on the burning of fossil fuels. Burning fossil fuels like coal, contribute to the greenhouse effect because they release poisons into the atmosphere like carbon dioxide. Sulphur is also a result of burning fossil fuels and it causes acid rain in our environment.
- Tidal power can also provide secondary benefits because transportation corridors can be built above the tidal generators. These can support roadways, water mains, rail lines, or communication lines, which again can balance the cost of installing the tidal equipment.
- And, unlike 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.
- Tides are predictable and go in and out twice a day, making it easy to manage positive spikes.
- Its predictability makes it easy to integrate into existing power grids.
- Tidal energy is completely renewable.
- Tidal energy produces no emissions.
- Energy output is a 100 % reliable.

- Hidden beneath the water.
- Tidal energy reduces dependency on oil reserves from other countries.
- Dams built can double as protective cover for coastline during craggy weather.

3.2 Disadvantage

- The major difficulties with this type of system is that the off shore turbines cost more money
- They are also more costly to maintain as they function under water. Furthermore, sea water is corrosive to steel and other metals because of the salt content.
- Fishing has to be banned in the areas of the power plant.
- Damages habitat up to 500km away

CONCLUSION

Tides play a very important role in the formation of global climate as well as the ecosystems for ocean habitants. At the same time, tides are a substantial potential source of clean renewable energy for future human generations. Depleting oil reserves, the emission of greenhouse gases by burning coal, oil and other fossil fuels, as well as the accumulation of nuclear waste from nuclear reactors will inevitably make people to replace most of our traditional energy sources with renewable energy in the future . Tidal energy is one of the best candidates for this approaching revolution. Development of new, efficient, low-cost and environmentally friendly hydraulic energy converters suited to free-flow waters. This type of machine, moreover ,can be used for multi-megawatt tidal power farms and also used for mini-power stations with turbines generating a few kilowatts. Such power stations can provide clean energy to small communities or even individual households located near continental shorelines, straits or on remote islands with strong tidal current.

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