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Design and Fabrication of Hybrid Power Liner

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ABSTRACT:

Archaeology shows the practice to be widespread by the beginning of the 1st millennium BC, and as early as the earliest records of waterborne activity mention the carriage of items for trade; the evidence of history and 14th and 15th centuries BC small Mediterranean cargo ships like those of the 50 foot long (15–16 meter) ship were carrying 20 tons of exotic cargo; 11 tons of raw copper, jars, glass, ivory, gold, spices, and treasures from Canaan, Greece, Egypt, and Africa. The desire to operate trade routes over longer distances, and throughout more seasons of the year, motivated improvements in ship design during the Middle Ages. Before the middle of the 19th century, the incidence of piracy resulted in most cargo ships being armed, sometimes quite heavily, as in the case of the Manila galleons and East Indiamen. They were also sometimes escorted by warships.

Keywords: Pollution, Hybrid, Electric cargo ship, Charging.

1. Introduction:

Due to its low cost, [1] most large cargo vessels are powered by bunker fuel also known as Heavy Fuel Oil which contains higher sulfur levels than diesel. This level of pollution is increasing: with bunker fuel consumption at 278 million tons per year in 2001, it is projected to be at 500 million tons per year in 2020. International standards to dramatically reduce sulfur content in marine fuels and nitrogen oxide emissions have been put in place.[2] Among some of the solutions offered is changing over the fuel intake to clean diesel or marine gas oil, while in restricted waters and cold ironing the ship while it is in port. The process of removing sulfur from the fuel impacts the viscosity and lubricity of the marine gas oil though, which could cause damage in the engine fuel pump. The fuel viscosity can be raised by cooling the fuel down. If the various requirements are enforced, the International Maritime [3] Organization's marine fuel requirement will mean a 90% reduction in sulfur oxide emissions; whilst the European Union is planning stricter controls on emissions. Cruise ships, like other big vessels, use a huge amount of ballast water to stabilize the boat while travelling. As these vessels travel longer, the Ballast water is often filled from one region and discharged in another whenever required. The amount of ballast water released typically is around 1,000 [4.5] metric tons. This discharge of the ballast water from the cruise ships is a significant cause of cruise pollution. The noise the passing ships produce badly affects the environment as it disturbs the marine ecosystem. Unlike other ships, Cruise ships contribute heavily to marine noise pollution as the windows of noise pollution are high in cruise ships. In addition to the noise pollution from the ship’s machinery, cruise ships produce more noise thanks to the entertainment activities on board. These noises disturb the marine animals and mammals, including killer whales and dolphins, whose sensitive hearing gets harmed and debilitated, often leading to their unwanted death and an overall loss to the ecosystem. It is [6] estimated that cruise ships contribute 24% to the total solid waste generated by maritime traffic across the world as one of such luxury vessels can produce seven tons of garbage and solid waste in a single day. A cruise ship’s [7] solid waste materials include paper, cardboard, aluminum, etc. Such materials form unwanted debris on our oceans’ surface, posing large-scale threats to marine plants and creatures. In addition to the air and water pollution these cruise ships cause, Whales[8] and Dolphins are also victims of the increasing traffic of these ships. These massive ships are responsible for injuring, often killing, marine lives, particularly fin whales, killer whales, and humpback whales. Considering [9] the risks and the damages caused to the marine environment, countries have laid proper resolutions to protect the oceanic surroundings. Slowly and steadily, even cruise shipping conglomerates have begun to understand the importance and necessity of preserving the marine ecosystem. For the time being, a better cruise shipping experience with the necessary caution and care for the aquatic [10] life remains a dream to be realized and attained. Hopefully, it will be in the days and years to come.

2.0 Way of Battery Charging

(a) Primary Charging System: whenever the ship is reaches to the destination point or port, we can plug into the charge of 110v DC power, the power which is taken from the near by solar station in 6 the harbor area. compare to ac charging dc charging is the faster so that we are using the primary charging as 110v dc.

(b) Solar charging:

solar is renewable energy source, when the sun light starts at sun rise the solar panels get started to absorb the sun light and it should be started to generate the electricity through that we can charge the batteries.

© Wind energy charging system:

In this wind energy charging system, the electricity can be generated by using wind flow, the minimum wind flow in the ocean is 15 miles per hour. So, we are using a special mechanical arrangement to collect the air flow

2.1 DESIGN AND FABRICATION :

Battery selection: Voltage = 12v Current= 6A

Power of battery p= Vx I =12 x6 =72w

Need of batteries

No. Cells =required current /current of one cell = 60000 2200 =2.7 =3 cells

In series connection voltage should be varied = 4.2+4.2+4.2 =12.6 volts.

In parallel connection current should be varied =2200+2200+2200 =6600m Ah 1 mah = 0.001 Ah 18650 Li-ion Cells x 3

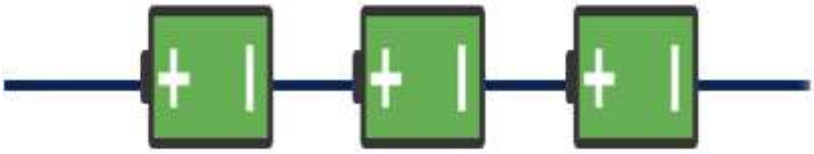


Fig 1:6Amp BMS (Battery Management System)

0.15mm Coated Nickle Strips

Connections for 12V Battery Pack with BMS

Every 18650 cell can be charged up to 4.2V; we need three cells in series to make a

12.6V battery pack. In the figure above, the connections are indicated.

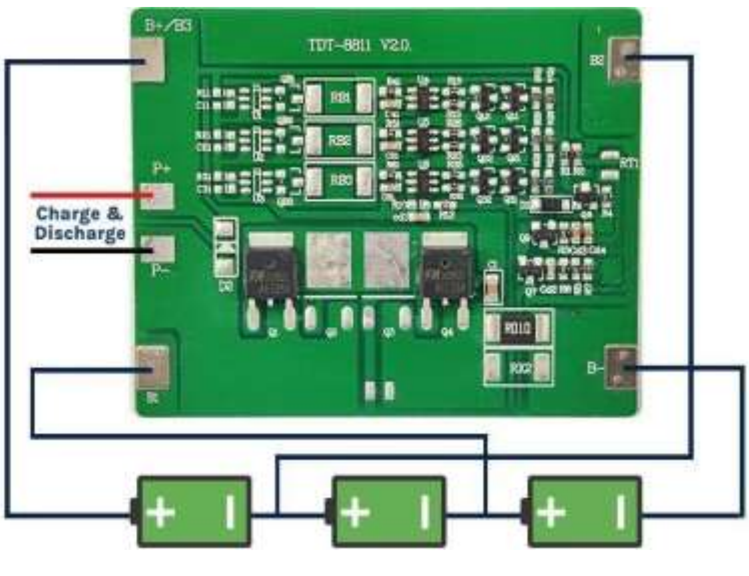


Fig.2: 6Amp BMS (Battery Management System) wiring

2.2 Battery case design

Length= 15 cm Width= 6cm

Hight= 6cm

Fig.3. Battery

2.2 Hybrid power liner body design

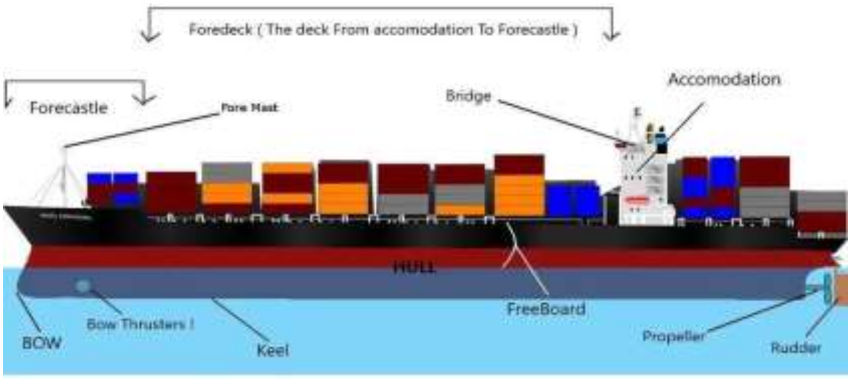
The basic shape of the ship is designed by using CATIA V5 software. Length of the ship is l= 140 cm

Width of the ship w = 30 cm Height of the ship h = 25 cm Weight of the ship W=5 kg Load carrying capacity L=25 kg

Container capacity (6*3*3) = 280 Area of the cargo space = 25000 sq cm

2.3 Basic parts of ship:

A ship is like a floating city having several different parts. However, we cannot imagine a ship without its three main parts: The Hull, an engine room and a navigation bridge. A ship comprises both visible as well as invisible parts. E.g. rudder, anchor, bow, keel, accommodation, propeller, mast, bridge, hatch coves and bow thrusters are some common visible parts. In contrast, bulkheads, frames, cargo holds, hopper tank, double bottom, girders, cofferdams, side shell etc., are the invisible parts of a ship.



2.4 The Laws of Buoyancy

1. Floating objects possess the property of buoyancy.
2. A floating body displaces a volume of water equal in weight to the weight of the body.
3. A body immersed (or floating) in water will be buoyed up by a force equal to the weight of the water displaced.

2.5 Hybrid power liner design models

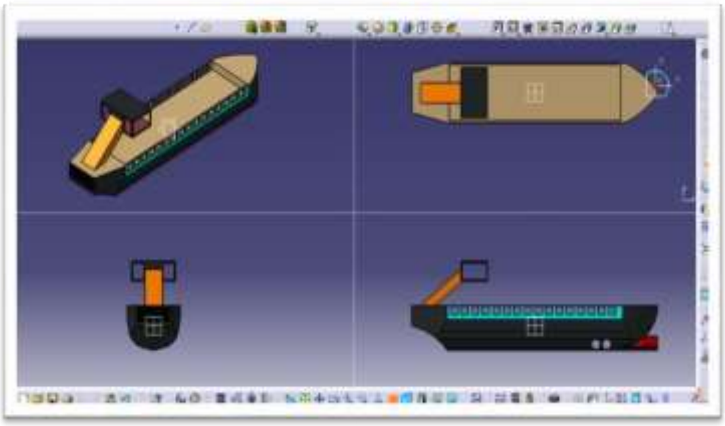


Fig.4: Over view of vessel

A turbine is a machine that transforms rotational energy from a fluid that is picked up by a rotor system into usable work or energy. Turbines achieve this either through mechanical gearing or electromagnetic induction to produce electricity. A wind turbine turns wind energy into electricity using the aerodynamic force from the rotor blades, which work like an airplane wing or helicopter rotor blade. When wind flows across the blade, the air pressure on one side of the blade decreases.

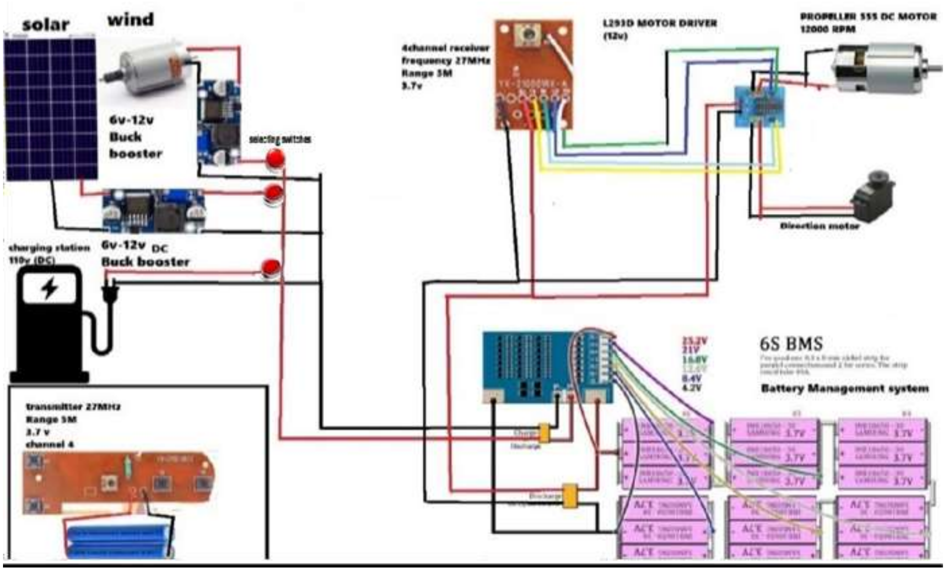


Fig.5 Circuit diagram

3.Conclusion:

The hybrid power liner can reduce less emissions and greater fuel consumptions. Really 10 million marine lives are going to be die every year because of emissions of the ships. Our Hybrid vehicle Hybrid power liners are ship that combines engines with electric propulsion systems, such as batteries. These hybrid systems can provide many benefits, including reduced emissions, improved fuel efficiency, and increased flexibility in power management. In conclusion, hybrid power liners are a promising solution for the shipping industry to reduce its environmental impact while maintaining efficient and reliable operations. As technology continues to advance and the demand for sustainable shipping grows, hybrid power liners are likely to become an increasingly common sight on our oceans. The ship can run with the zero fuel, it can run by using battery power at the time the batteries are can be recharged by using renewable energy sources such as the solar and wind energy. Whenever we are testing that the hybrid power liner, the solar cell can produce the electric power 8v to 12v, and the wind is reaches to the wind pocket the travelled into the tunnel. At the end of the tunnel turbine is placed. It can produce 6v to12v Completion the fabrication and assembly we are going for testing in the water as the result we observed that the ship can be balanced accurately and carry the load along with the containers.

The speed of the ship is =500 m/h. (3.7 nautical mile) Load carrying capacity= 25kg.

Battery life = 30 minutes each.

Future Scope

The future of electric ships looks promising as there is a growing demand for cleaner and more sustainable transportation options. Electric ships offer several benefits over traditional fossil fuel-powered ships, including lower emissions, reduced noise pollution, and lower operating costs in the long run. One of the main challenges for electric ships has been the limited range of their batteries, but advancements in battery technology are constantly improving their energy density, enabling them to travel longer distances without recharging faster refueling times than traditional batteries, making them a viable option for larger vessels. Another area of development is in the use of hydrogen fuel cells as an alternative power source for ships. Hydrogen fuel cells have the potential to provide longer ranges and. In addition, the implementation of smart grid technology and renewable energy sources, such as wind and solar power, could further increase the efficiency and sustainability of electric ships. Overall, the future of electric ships looks bright, and we can expect to see continued innovation and development in this area in the years to come.

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