

Extended summary of the Presentation

The ECO Ship project

green cruising with LNG, fuell cells, sails and solar panels

Presented by Detlev Loell CEO and Owner of Detlev Loell Engineering GmbH, Peenemuende, Germany
July 2021

Short description of the company

Detlev Loell engineering GmbH is based in Peenemuende, a village at the northern tip of the island Usedom. A small village with a big history, it was the place of the invention of the rocket V2, it's successor *Saturn V* reached the moon.

The company is specialized in the design and engineering of Tallship riggings, since 1987 several designs are made and actually built. Some samples are: The passenger sailing vessels LILI MARLEEN, SEA CLOUD II, SEA CLOUD SPIRIT, the sailtraining vessels FRIDTJOF NANSEN, ROALD AMUNDSEN, NOBILE, VORPOMMERN, the military training vessels CISNE BRANCO, BIMA SUCI

With the 100% sister company Detlev Loell Riggers Ltd, we build and repair tallship riggings. Detlev Loell is the only German tallship inspector, certified by DNVGL.

The host of the project ECO SHIP

The ECO SHIP is a project of the NGO PEACE BOAT, this is a global non-government organization headquartered in Japan established for the purpose of raising awareness and building connections internationally among groups that work for peace, human rights, environmental protection and sustainable development. Since its founding in 1983 Tokyo based organization has launched more than 100 voyages on chartered passenger vessels. These cruises, the main operation of the Peace Boat organization, are carried out at least three times a year. PEACE BOAT offers educational opportunities aboard, with conferences related to global events. They also provide humanitarian aid at their various stops and visit local organizations.

Besides the international voyages, PEACE BOAT carries out a number of other projects seeking justice in various international realms such as a campaign for the abolition of land mines or the Global Article 9 Conference to Abolish War onboard and in ports. PEACE BOAT also acts as the Northeast Asia regional secretariat of the Global Partnership for the Prevention of Armed Conflict and is member of ICAN (International Campaign to Abolish Nuclear Weapons), having played a significant role in negotiations to strengthen the Treaty on the Prohibition of Nuclear Weapons, which was awarded the Nobel Peace Prize on December 10, 2017. PEACE BOAT is an NGO in Special Consultative Status with the Economic and Social Council of the United Nations and a committed campaigner for the Sustainable Development Goals (SDGs).

The nonprofit organization was founded 1983 by Yoshioka Tatsuya (also the current president), since more than 30 years the organization does operate chartered passenger vessels. The actual one is the PACIFIC WORLD, built in 1995 at FINCANTIERI. The ship is now owned by PEACE BOAT. The PACIFIC WORLD is 261 m long and has 10 passenger decks for about 2000 passengers plus 5 decks for the crew, 920 person strong. The ship was obtained in 2020.

A part of this description was taken from WIKIPEDIA

History of the project ECO SHIP

PEACE BOAT has started the project ECO SHIP in 2013. The base of the idea is to develop the most sustainable passenger ship in the world. This ship should fit into the basic philosophy of PEACE BOAT. The first preliminary project for the wind powered propulsion system was done by us in 2013. At that time for wind turbines, producing electricity only.

2014 a charette was organized by the NGO PEACE BOAT in Hamburg, Germany. Participants where experts from all over the world for sustainable energy, solar cells, sail design, passenger ship design,

propulsion systems, LNG, circular economy. The charrette lasted a full week, in several work groups information was shared and new ideas discussed. Following that, a draft specification for the new ship was done and since that, further developed.

During the last 7 years the ship design was further developed by several companies, like OLIVER DESIGN in Spain for the outside design and the interior, DELTAMARIN, Finland for the ships structure .

Design

We received the order to do the design and engineering of the sail system . We conducted an intensive research and checked the pros and cons of several different systems. Like Skysail, Flettner rotor, Dyna-Rigg, standard Bermuda rig, Indosail and various others.

The most effective one is the rigid profile sail, like the ones use for the Americas cup catamarans. The problem is, to get this ultimate performance ready for the daily use and fully automated for world wide service on board of a passenger vessel.

Here the result:

The picture shows the ship with a full set of foldable wing sails, each 42 m high, consisting of 3 different panels, nose, main panel and aft panel. The aft panel could be folded onto the main panel. The main panel is the main structure, this is connected to the main swivel. The sail



Rendering done by Oliver design

could rotate 360 degrees. The sails mast could be lowered onto the deck.

To enhance the sails power, we have foreseen a winglet on top of each sail , made from foldable panels. The whole sails system is to be constructed from carbon fiber sandwich with honeycombs and epoxy resin.

The main safety risk of sailing systems, no matter whether traditional or modern, is to get rid of the sail in a squall. In case one could not reduce the sail area in higher winds, this could be the cause of a serious stability problem.

The sails operation will be done by hydraulic cylinders. The whole system is designed with a hydraulic redundancy and a hand driven second redundancy. This will ensure, that the system could be lowered at any time, under any condition.

Other features discussed are LNG powered main propulsion, using electric azipods for more efficiency.

Solar panels at the sails, the balconies, the surfaces of the superstructure decks will help to reduce the fuel consumption. Shaft generators and fuel cells will produce the electric power for the hotel.

The hotel load will be reduced by the use of individual energy monitors for each cabin. These will show the energy consumption of each cabin (A/C, electric power, hot water) visible for all other passengers. Following the experience of the owners with the previous ships this will help to reduce the hotel load at about 15 %.

During the presentation some insight will be given on other projects from our “drawing boards”, like the sailing 500 TEU freighter PEKING H² (developed together with TECHNOLOG, Hamburg).