WORKSHOP 20 APRIL 2021

"ALTERNATIVE ENERGY SOURCES FOR ELECTRICAL PROPULSION SYSTEMS"

CASE STUDY: PASSENGER VESSEL 100% ELECTRIC

RIVER CREATION - DUCASSE SUR SEINE – PARIS

SPEAKER: JEAN-ROBERT PERROCHES
River Creation

Restaurant Boat

- Owner, ALAIN DUCASSE, multi-star MICHELIN chef.
- Mooring in Paris, opposite the Eiffel Tower, at the port Debilly.
- Navigation on the Seine, 12 km loop.
- Capacity 130 guests.
- Maximum 200 persons.
- 2 cruises of 2hour30 per day for lunch and dinner, 365 days a year.
- Great cuisine on board in accordance with the standards of a top-of-the-range gastronomic restaurant.
RIVER CREATION
SHIPBUILDING

- Project owner, CITYSURFING (Christophe GALLINEAU).
- Architect designer, SEINE DESIGN (Gérard RONZARTI).
- Shipyard, CHS Région Parisienne.
- Shipbuilding management, AMO FACILI (Jean-Robert PERROCHES).
- Survey and classification, BUREAU VERITAS.
- Union certificate, DRIEA PARIS.
- Certified in accordance with ES-TRIN.
- Building started in June 2017
- Commissioning in September 2018
- Hull and superstructure in steel.
- Dimensions 38m x 9m, deadweight 300 tons, speed 15 km/h max.
- Batteries 2x380 kWh lithium iron phosphate battery, POWER TECH
- Power electronics and control/monitoring, KEB
- Azimuth thrusters, ZF MARINE
• Accurate electrical power balance.
• Simulation of power consumption according to the modes of use and navigation.
• Average speed in navigation 5 to 6 km/h.

Cruising time: 2h30, Distance: 12 km;
Frequency: twice a day

- Propulsion 400kw
- Kitchen 100kw
- Air con 40kw
- Lighting 10kw
- Sound system 2kw
- Auxiliary 20kw

Electric power installed 572kw
• 2 identical engine rooms, one at the stern, the other at the bow.
• The engine rooms are completely electrically independent, so there is no possibility of an electrical or electronic fault spreading from one to the other.
RIVER CREATION

ELECTRICAL ENGINE ROOM

• 2 identical and symmetrical engine rooms, redundancy of the systems, the vessel can operate with only one.

• Each battery supplies one thruster and half of the rest of the on-board electrical system.

• Azimuth thruster; 180kW available at the propeller, driven by a 200kW electric motor with DC/AC speed controller.

• Circuits cooling with water with BOXCOOLER exchanger.
RIVER CREATION
BATTERIES

- 2 systems of 380kWh under 660V DC meaning 760kWh.
- 2 x 5 tonnes divided into 4 sub-assemblies.
- Rack-mounted drawer type in cabinets.
- Monitoring by Master BMS and Slave BMS.
- Intercommunication via CAN BUS.
- 3 year warranty + 5 year extension.
- Value 684K€.
RIVER CREATION CYCLES BATTERIES

- Recording of the charge and discharge cycle of the bow batteries over a period of 6 days of operation.
- Night-time charging from 10pm to 1am.
- Daytime charging from 2.30 pm to 5 pm.
- Maximum discharge at the end of the cruise 66%.
- For the stern batteries, same profile but with a maximum discharge close to 50%.

Per day of two cruises;
- Navigation time 5 hours.
- Mooring time 19 hours, of which approximately 4.5 hours are spent charging the batteries.

=> The ratio of sailing time to docking time is perfectly adapted to the batteries.
RIVER CREATION
BATTERIES CHARGING
AT DOCK

- Battery voltage 660V DC
- 304 kWh per cruise
- 8 chargers per engine room, water cooling.
- 2 Tetra polar connection, 400V AC 120 kW power outlets supplied by the public electricity distribution network.
- Power supply line, specially created on the port for the River Creation, connection 240kVA Tri 400V AC
- Charging time 0-100% = 4h
- Temperature monitoring and control during charging by BMS.
RIVER CREATION

RETURN OF EXPERIENCE

• 2 years of study.
• 1 year of shipbuilding.
• 3 months of trials/fine tuning.
• 2 years of use.
• 1260 cruises, 100,000 passengers.
• Consumption 390,000 kWh electricity.
• 3% of them required partial or total use of the emergency generator set.
• Cycle of use perfectly adapted to battery operation.

• Net energy consumption equivalent to 97,500 litres of non-road gas oil.
• 260 tonnes of CO2 emissions avoided.
• Very quiet navigation, appreciated by customers.
• Quick handling by the crew
• Maintenance contract, but very low maintenance.
• Remote monitoring and remote repair.
THANK YOU FOR YOUR ATTENTION AND SEE YOU SOON ON BOARD!