



The Detail Design of a Wooden, Solar-Electric Launch for the Carmans River Maritime Center

Abstract

In an age of advanced composite construction, America's rich tradition of wooden boatbuilding is slowly fading into the past. During the winter of 2010, the Carmans River Maritime Center (CRMC), a non-profit museum and workshop for wooden boatbuilding located in Brookhaven, New York, partnered with Webb Institute to design a solar-electric wooden boat for ecological tours of the Carmans River and surrounding environments. This project aims to meet the CRMC's design needs. Given the mission of the vessel, emphasis was placed on utilizing eco-friendly technologies including photovoltaic panels and all-electric propulsion. Through research and a strong client-designer relationship, the project recommended solutions for synthesizing modern technology with traditional aesthetics. The design package includes a lines plan, construction drawings, and bill of materials for the 24-ft, six-passenger launch powered by a 4.0 kW electric outboard motor with a design speed of 5 knots. The design is an educational project, and it is recommended that the design be reviewed by a professional before construction.

Outboard Electric Motor

Make/Model _____ Torqeedo Cruise 4.0RS
 Brake Horsepower _____ 4.0 kW
 Voltage _____ 48 V DC
 Weight _____ 37 lb
 Maximum Propeller RPM _____ 1250 rpm

Design Requirements and Constraints

Characteristic	Constraint	Reason for Constraint
Length	No greater than 26'	Set by CRMC
Beam	No greater than 86"	Trailer width limitation
Draft	No greater than 2'	River shoal depth
Complement	1 operator, 1 interpreter, 6 passengers	USCG 6-Pack License/ (OUPV)

Additional Requirements

- All-wooden construction with a traditional aesthetic
- Electric propulsion with onboard solar panels for recharging
- Ability to safely cross the Great South Bay to Fire Island
- A range greater than 12 nm

Solar Panels

Make/Model _____ 4 x Sharp NU-U240F1
 Maximum Power _____ 4 x 240 Wp
 Panel Efficiency _____ 15%
 Weight _____ 4 x 44 lb
 Type of Cell _____ Monocrystalline silicon

Principal Characteristics

Length, Overall _____ 24'-0"
 Length, Waterline _____ 23'-1"
 Beam, Maximum _____ 7'-6"
 Draft _____ 1'-3"
 Displacement _____ 4000 lb
 Block Coefficient _____ 0.46
 Cruise Speed _____ 5.0 knots
 Maximum Speed _____ 5.5 knots
 Installed Brakepower _____ 4.0 kW
 Range at Cruise Speed _____ 16 nm
 Range at Cruise Speed with Peak Solar Power _____ 24 nm



Design Team



Hampton Dixon

Hometown: Kingsland, GA
 Work Experience:
 - InterYacht Inc. - StarJah Design Intern
 - Huckins Yacht Corporation - Design Intern
 - Chesapeake Shipbuilding - Shipyard Intern
 In His Leisure Time:
 - Yachting along the East Coast
 Career Plans:
 - Design, engineer, and construct cruise ships



Andrew Lachtman

Hometown: San Diego, CA
 Work Experience:
 - M Ship Co. - Naval Architecture Intern
 - Horizon Lines - Cadet
 - NASSCO - Shipyard Intern
 In His Leisure Time:
 - Cycling and camping
 Career Plans:
 - Joining Bruce S. Rosenblatt & Associates in Oakland, CA



Lidia Mouravieff

Hometown: Township of Washington, NJ
 Work Experience:
 - Quantum - Engineering Intern
 - Metal Shark Aluminum Boats - Engineering Intern
 - Military - Sealift Command Cadet aboard USNS Alan Shepard
 In Her Leisure Time:
 - Dancing, singing, and soccer
 Career Plans:
 - Pursue placement within Transportation Engineering field

Principal Advisor



Matthew R. Werner,

ABS Professor of Naval Architecture and Marine Engineering
 Professor Werner grew up on eastern Long Island and spent his childhood on the Great South Bay. His experience and industry knowledge provided valuable insight to a unique portion of Long Island. In his (marginal) spare time, he coaches and plays volleyball and soccer.