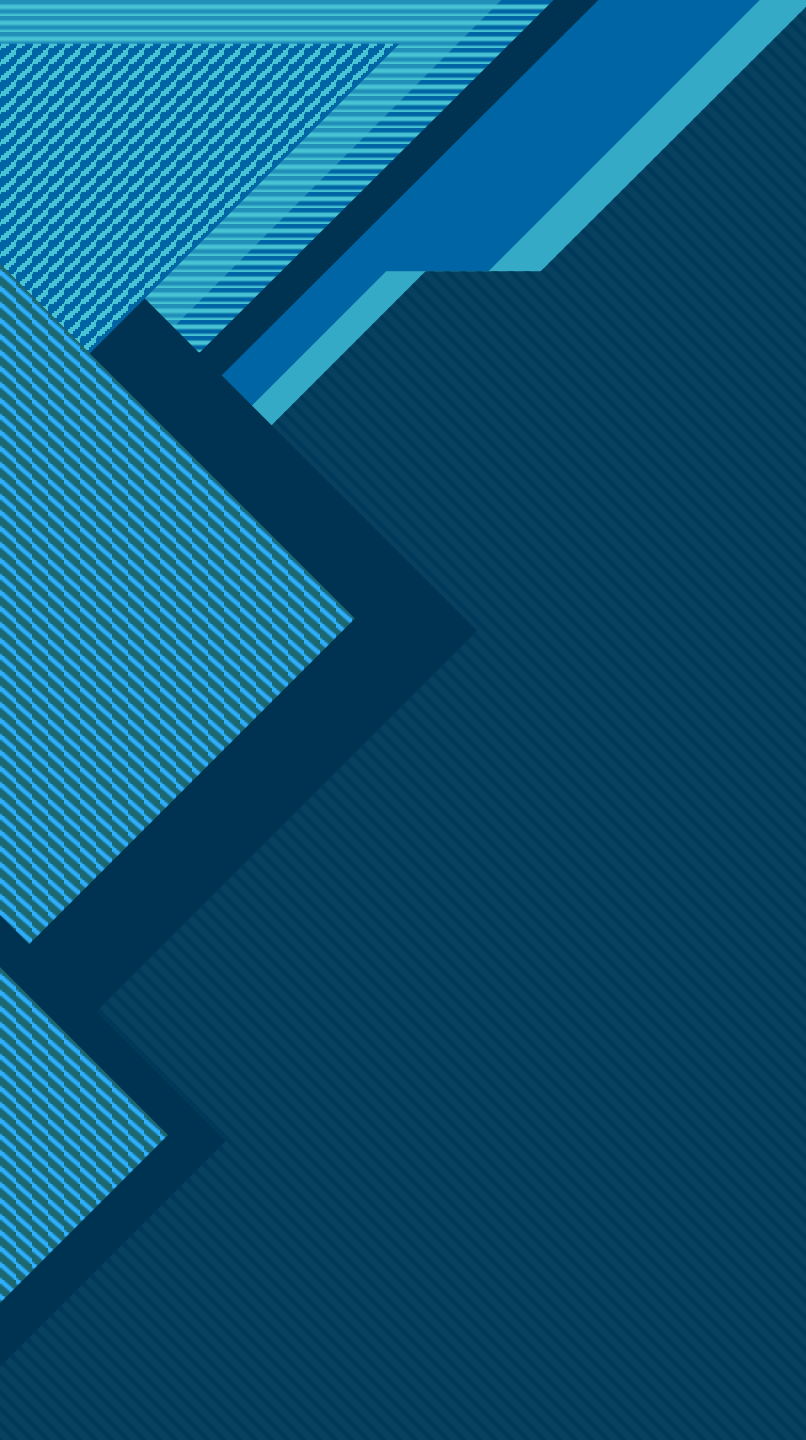




všj žalieji laivai ngo green boats

electric demo PAX boat open workshop

- ▪ ideas ▪ ELMAR project ▪ progress

design & reconstruction phase

tomas zapnickas

plan

- choosing of hull/boat type
- old hull purchase
- 3D scan
- design
- hull renovation
- construction of new exterior & interior components
- propeller line and steering system installation
- electrification
- sea trials
- improvements
- boat presentations

old hull

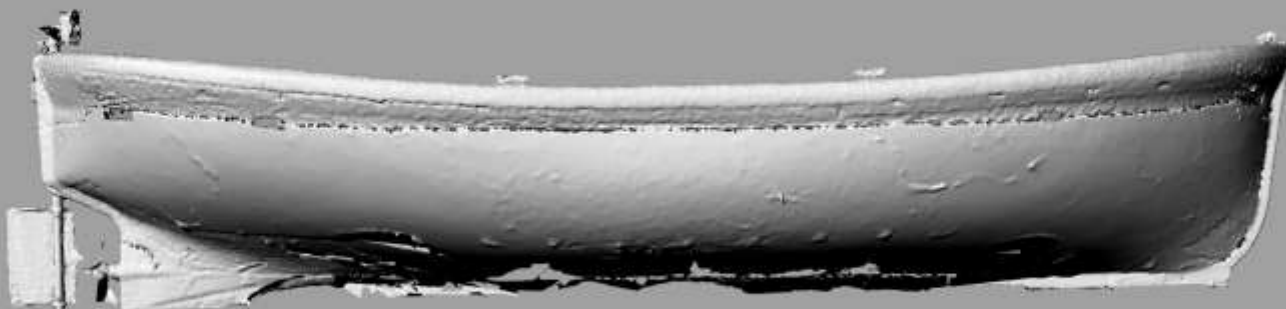
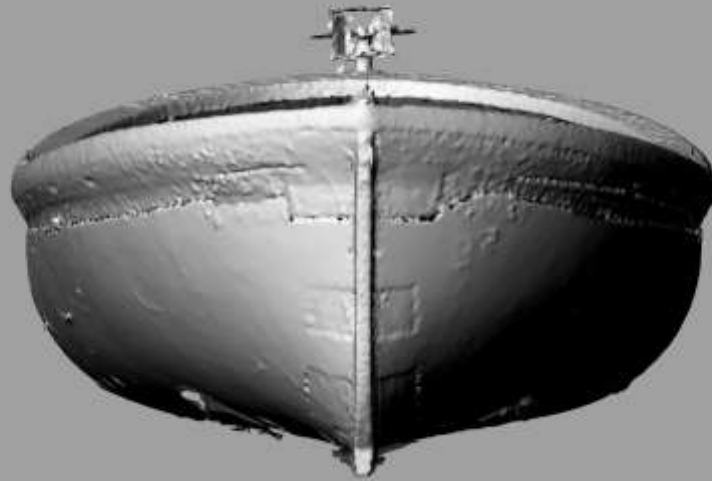
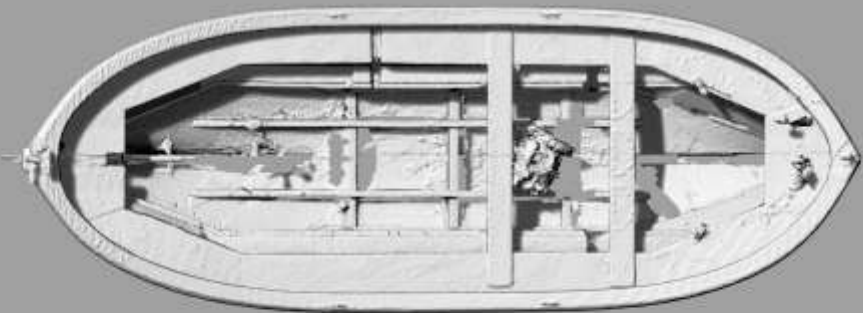
choosing of hull/boat type

- size
 - 8-10 m
- opentop or cabin
 - open deck with small front cabin
- speed
 - 5-7 kn
- range
 - 8-10 h, 50 nm minimum
- propulsion
 - electric

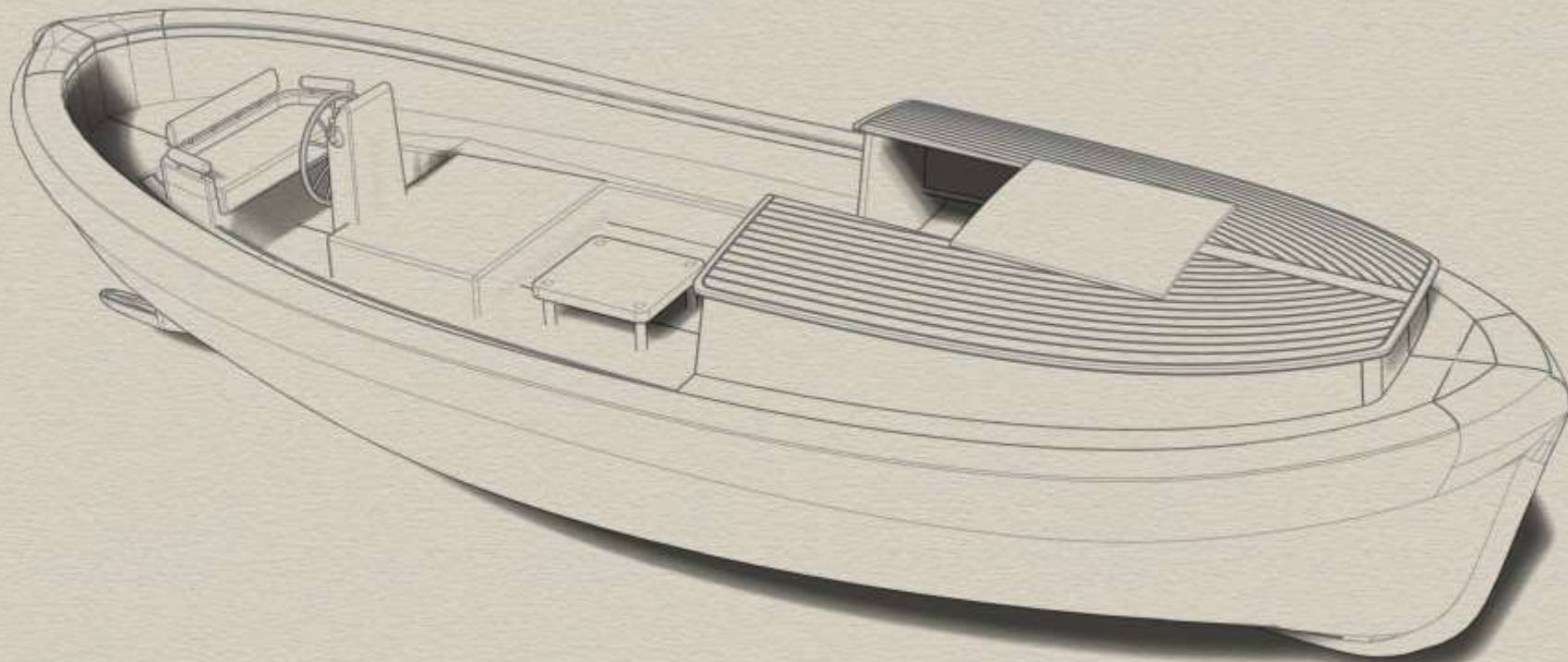
old hull purchase



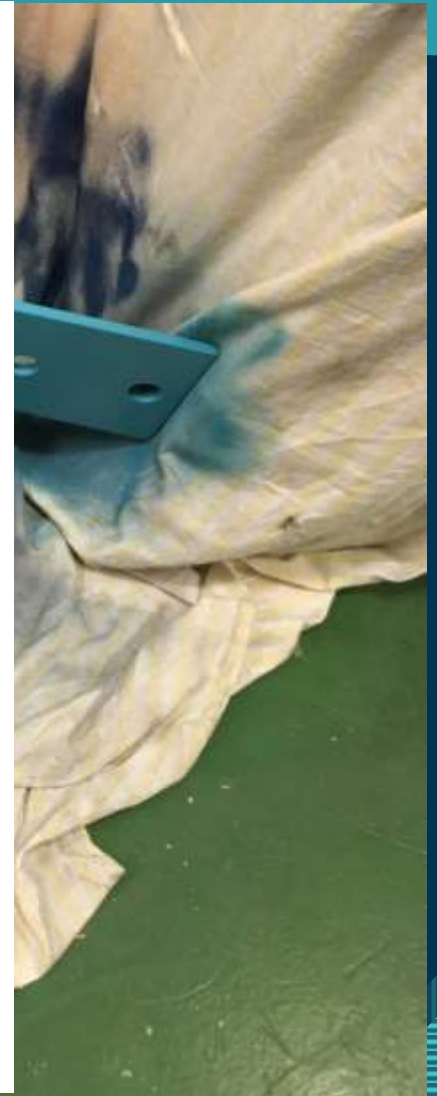
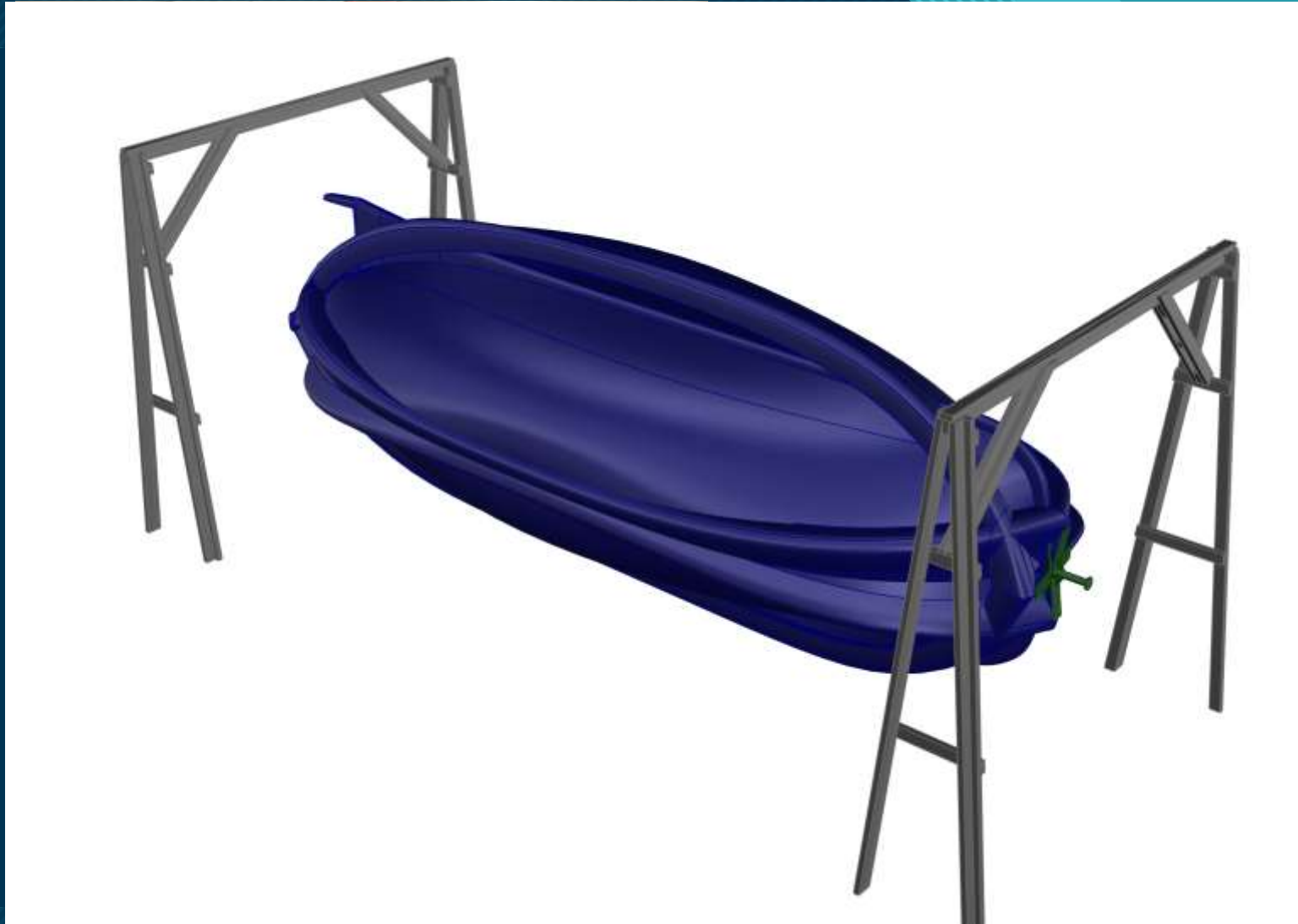
3D scan



3D scan & design



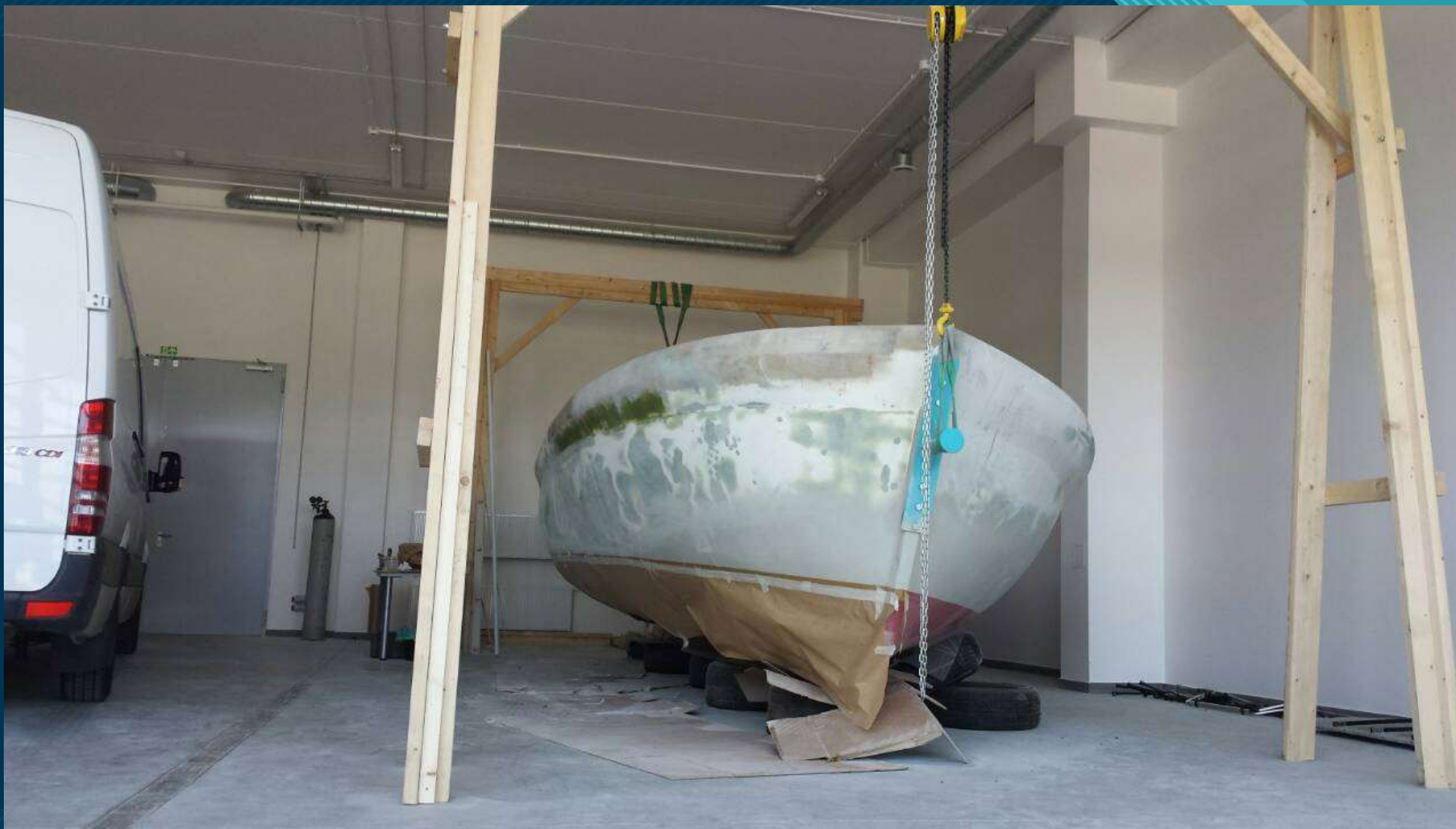
hull renovation



hull renovation



hull renovation



hull renovation



hull renovation



construction of new exterior & interior components



what left to do

- construction of new exterior & interior components
- 2020.03
- propeller line and steering system installation
- 2019.09
- electrification
- 2020.06
- sea trials
- 2019.09 & 2020.05
- improvements
- 2020.05
- boat presentations
- 2020.06

an idea to go electric

advantages

- clean boat – clean environment
- noise
- less maintenance

disadvantages

- range
- price



thank
you



všj žalieji laivai ngo green boats

electric demo PAX boat open workshop

- ideas ▪ ELMAR project ▪ progress

electrification phase

evaldas narusis

system overview

- motor
 - controller
 - battery
 - charger
 - bms
 - automation
- 15-28 kw
 - up to 60kw
 - 60kwh
 - 3,3kw

motor emrax188lv



- permanent magnet
- 100v max
- 400a continuous
- 7000rpm max
- 120°C max temperature
- liquid cooled

controller emsiso emdrive500



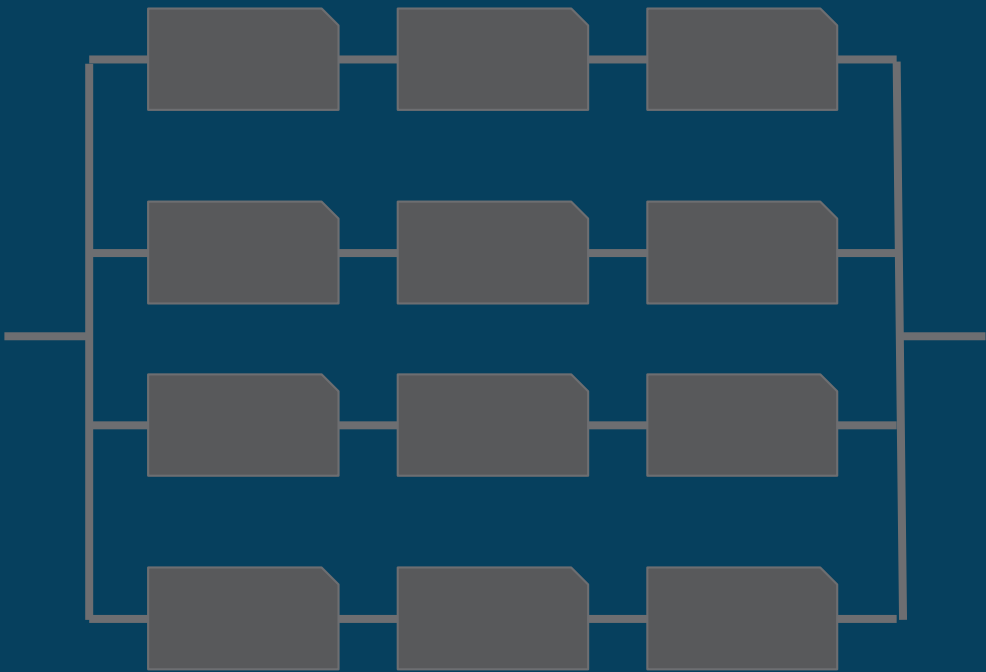
- 30v-120v
- 500a continuous
- canopen interface
- liquid cooled

battery tesla model s



- panasonicnc 18650b cells
- 74 parallel cells
- 6 series
- bms board
- balancing resistors
- 2 temperature sensors
- liquid cooling
- protection fuses

battery tesla model s



- 3 packs in series
- 4 groups in parallel
- 930a discharge
- 470a charge
- 75,6v charge cut-off
- 59,4v discharge cut-off

green center bms

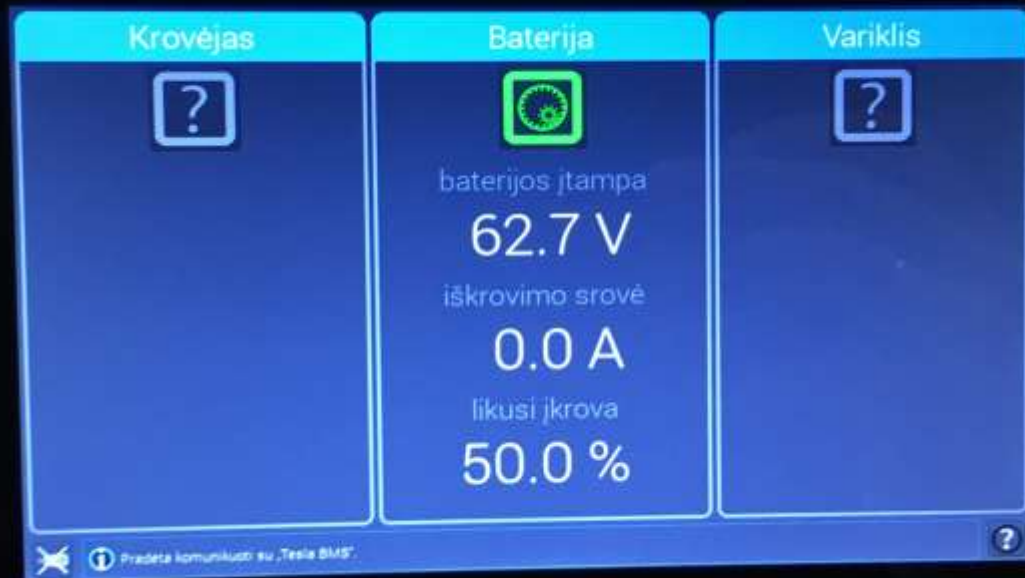


bms hardware



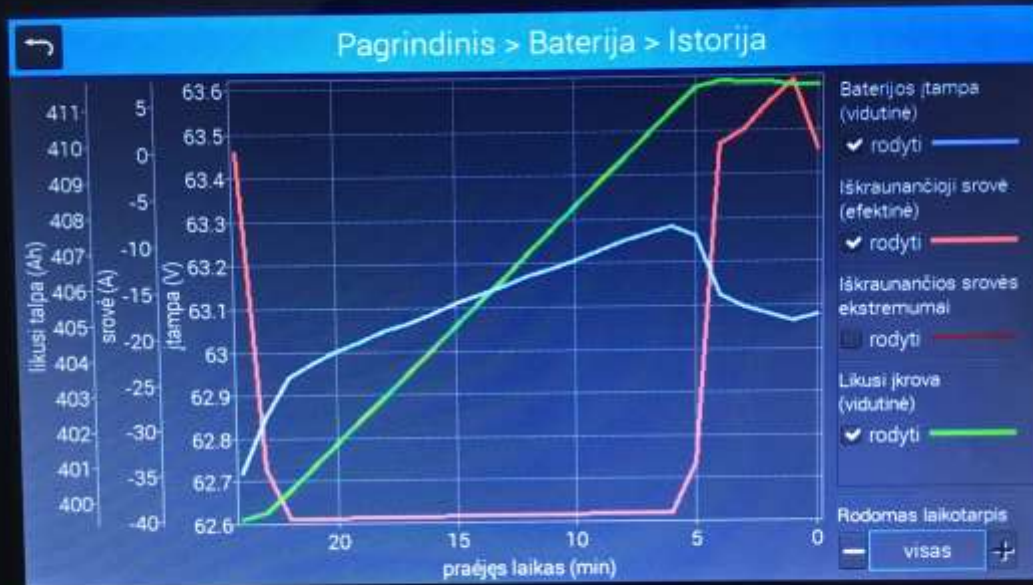
- communication with tesla bms modules
- based on 32bit arm microcontroller
- 4 isolated outputs channels
- 4 isolated input channels
- 2 can controllers
- 2 uart controllers

gc bms user interface



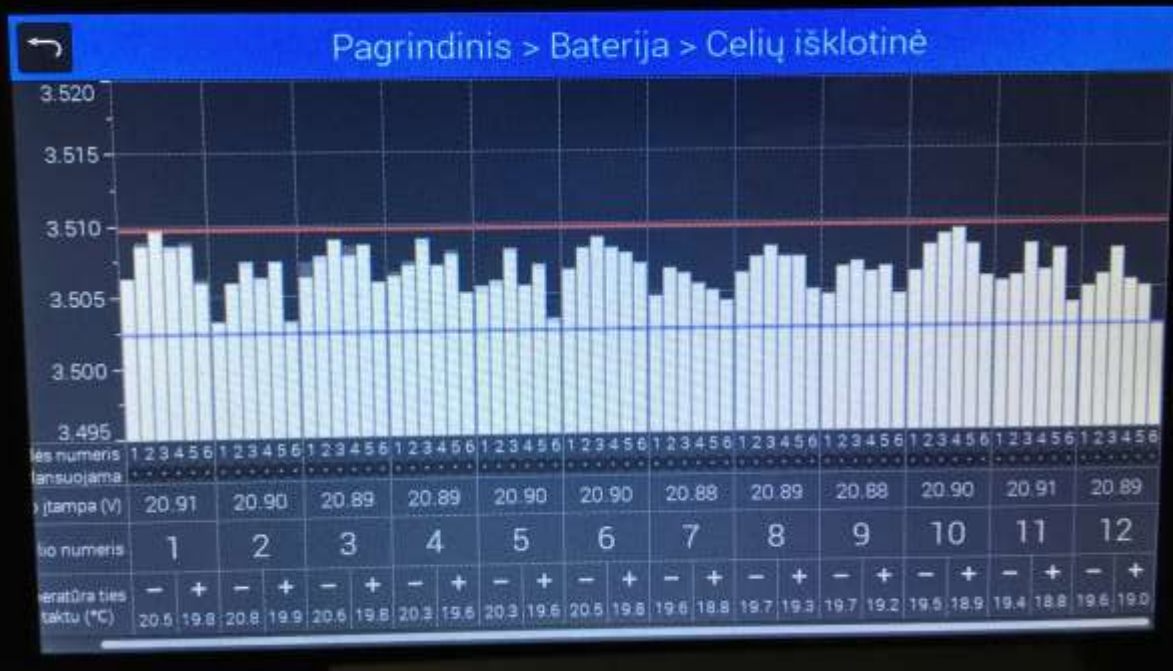
- charger information
- battery information
- motor information

gc bms user interface



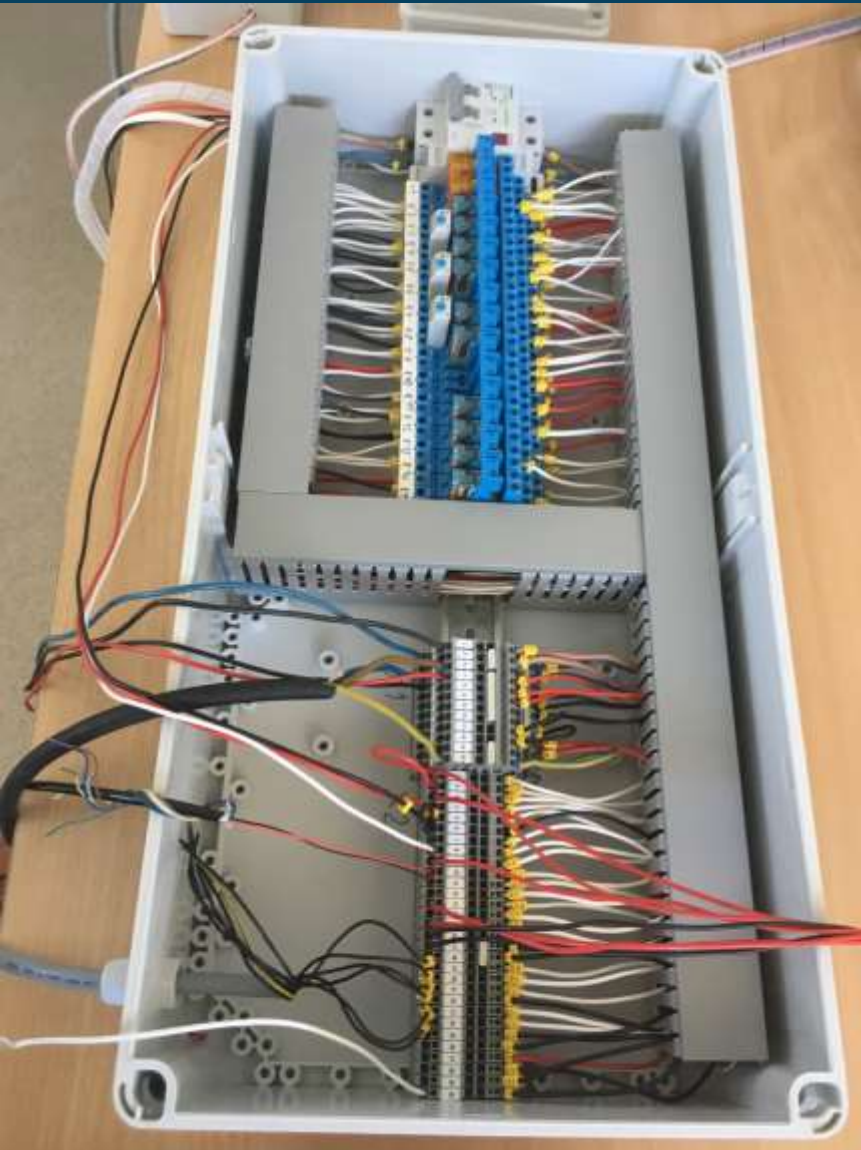
- voltage monitoring
- temperature monitoring
- current monitoring
- capacity monitoring
- data logging
- enabling disabling balancing of cells
- system protection
- ... still developing

gc bms user interface



- green center user interface
- voltage protections
- temperature protections
- current protections
- capacity monitoring
- enabling disabling balancing

automation



- drive control
- charger control
- emergency switch
- 12v power

thank you