Aalto University
School of Engineering

Principles of Naval Architecture

Class of 2020

Focus : Design innovation and creativity

Some Project Ideas

September 2020

Assignments

- The assignments are carried out in groups of 3 - 5 students
  - *Share the work load between your group members*
  - *Analyze and discuss your work together → Learn from each other*

- You are responsible to take initiative to meet and work together to get the job done

- Schedule your work, distribute and rotate tasks within your group
  - *Leader & coordinator: coordination, work scheduling, on-time delivery*
  - *Algorithm developer: responsible for the development and checking of spread sheets and algorithms*
  - *Data collector: responsible of the required data to do the job*
  - *Reporter: responsible for reporting the work in clear and efficient way*

- Report who did what

Assignments (cont.)

- Assessment
  - *Overall assessment (0-5) based on the contents and the quality of your report*

- Importance of good reporting
  - *Your assignments are assessed solely based on your written reports → the presentation of your work is highly important*

  - *Recommended course*
    - LC-1310 Academic Communication for MSc Students
      - Learning outcomes: strategies and elements for clarity and audience-friendliness in both oral and written academic communication, formal vs. informal styles of communication, systematic development of oral and written work, proper use of sources,...

Two international competitions

https://www.ferrysafety.org/

https://www.njordchallenge.com/

A Ro-Pax Ferry for the Amazon River

Purpose : To design a Ro-Pax ferry for safe and sustainable operations between Manuaus and Tefe on the Amazon River in Brazil. Targets :

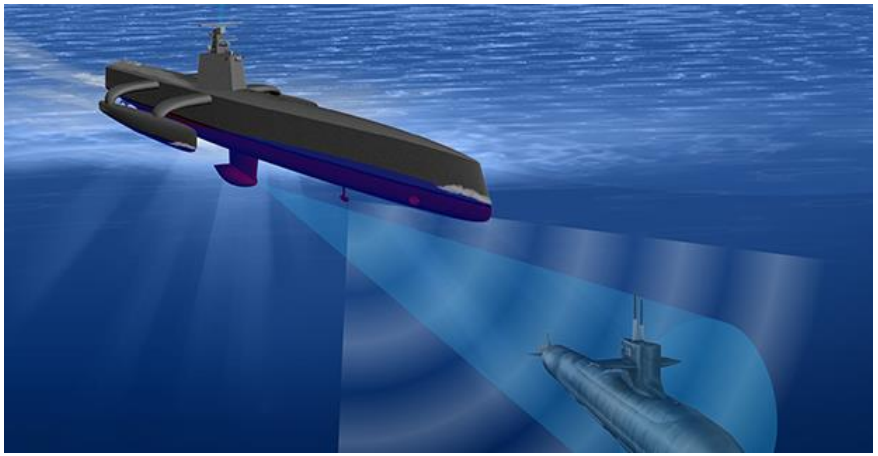
- Safety and Reliability : Improved stability, maneuverability and control
- Efficiency : Azipod propulsion unit systems & electrical power plant

Today

Tomorrow

Unmanned trimaran vessel for surveillance military operations

Purpose : To design a trimaran type unmanned naval vessel optimized to robustly track quiet diesel electric submarines. The platform should exceed state-of-the art performance. Autonomy should enable independently deploying systems capable of missions spanning thousands of kilometers of range and months of endurance. Non-conventional sensor technologies should be used to achieve track of submarine targets.



A Ro-Pax class Humanitarian Rescue Vessel for training and COVID relief

Purpose : To design a Ro-Pax vessel for anti-COVID operations in the Caribbean. The vessel will be supporting disaster relief efforts and also provide specialist training for maritime officer cadets, rating apprentices, and trainees in trades associated with aid and reconstruction. It will also be capable of serving as a commercial Ro-Pax ferry as opposed to being a one-off specialised vessel with limited applications.

Polar re-supply and research vessel

Purpose : To design a polar resupply and research vessel for use in arctic or Antarctic. The new vessel should be equipped for breaking up to 1.65m-thick ice, while sailing at a speed of 3 knots. It should include a flight deck, a hangar facility for two medium size helicopters, science laboratories and offices spread across an area of 500m². Propulsion should be diesel-electric integrating two controllable-pitch propellers, bow and stern thrusters, to produce a propulsion power of 26,600kW. Semi-autonomous operations should be considered alongside sensor arrangements for underwater research.

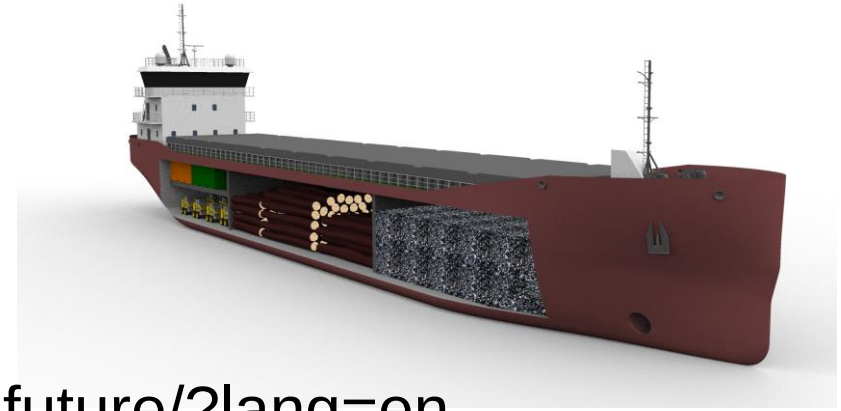
Healthy & eco-friendly cruiser

Design of a zero emmisions cruiser with top quality clean and healthy solutions against the pandemic

https://eu.usatoday.com/story/travel/cruises/2020/05/19/coronavirus-how-cruise-ship-design-may-change-prevent-outbreaks/3065160001/

Zero emission inland waterway vessel

- **Driver** : FIN government is planning to widen and deepen the locks along the canal of Saimaa lake area and extend the operational time to 11 months per year.
- **Aim** :
  - ✓ To design a multipurpose ice-capable cargo vessel, with most of the volume reserved from bulk cargos but also capable of carrying small amount of containers.
  - ✓ To explore and fulfil the potential of inland waterway transportation as a cost-effective and environmentally friendly option to attract the interest of transport companies.



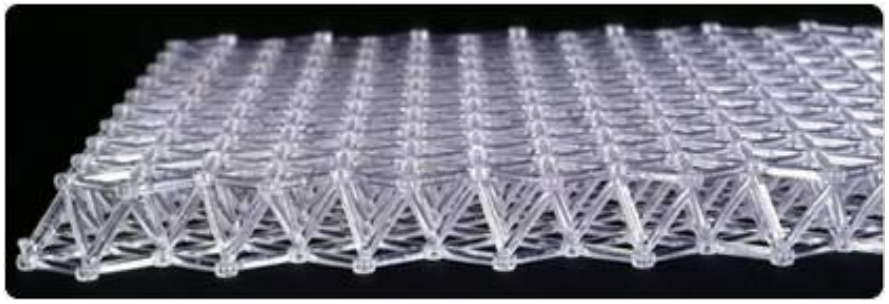
- https://www.merikotka.fi/projects/infuture/?lang=en

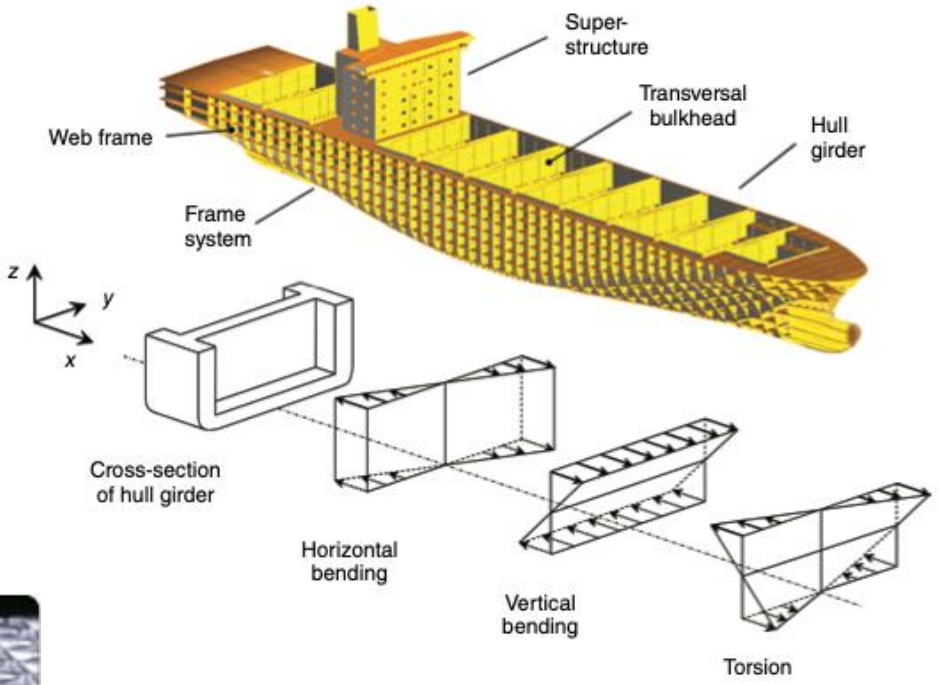
Zero emission Baltic icebreaker

- **Driver** : Finland and Sweden has started a design exercise aiming for the next generation Baltic icebreaker to replace the current Urho class vessels and the new sustainability requirements require innovative propulsion solutions
- **Aim** :
  - ✓ To design a next generation Baltic icebreaker, capable of operating year around on the northern Baltic Sea
  - ✓ To explore the possibilities for the future propulsion systems ie. Possible new emission free fuels and other possible solutions for zero emissions

Ultra-Lightweight Lattice Cargo Ship / Tanker

- **Driver:** Ship structures are often based on perpendicular intersections between bulkheads and decks. It is known from basic solid mechanics that this causes high bending moments to intersections which lower the strength of structures.
- **Aim:**
  - ✓ To design a next generation cargo ship where idea of lattice materials and structures are exploited
  - ✓ To demonstrate through first principles how much weight reduction is achievable and how this affects the usage of the ship.





Loft-cabiner

- **Driver:** Today cruise ships are destinations themselves for the travels. This means that in order to separate in the markets new concepts are needed. One of such ideas is the loft cabin introduced at Oasis of Seas – fleet.
- **Aim:**
  - ✓ To create the cruise ship with all loft-cabins concept with radical new features implemented at ship and loft level
  - ✓ To develop earning logic for this type of ship including the ticket price, customer segment and technical feasibility of the concept (e.g. structures)

Thank you