



INTERNATIONAL STUDENT DESIGN COMPETITION 2020: SAFE AFFORDABLE FERRIES

3RD PLACE AWARDEES PRESENTATION

SAFE AFFORDABLE RO-PAX FERRY FOR THE WINAM
GULF REGION OF LAKE VICTORIA IN KENYA

TEAM:




NEWCASTLE UNIVERSITY – SINGAPORE INSTITUTE OF
TECHNOLOGY



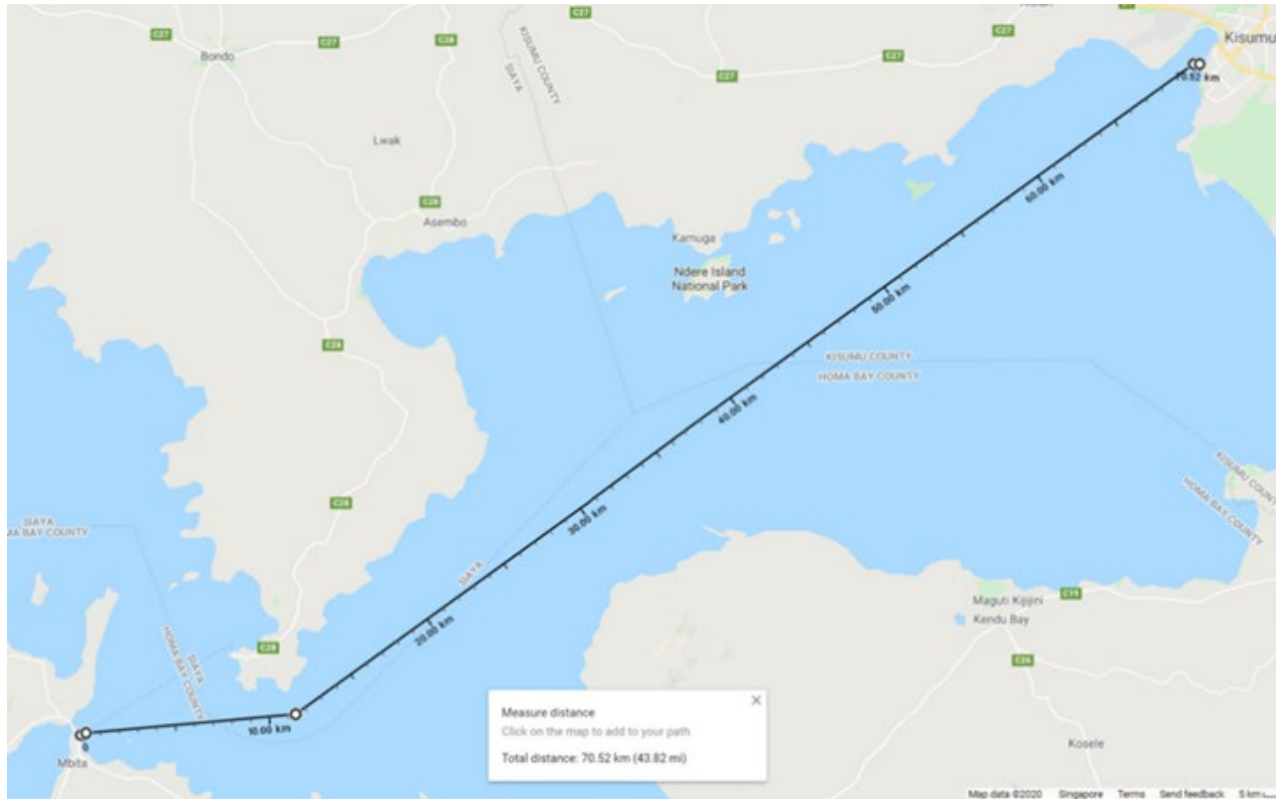


TEAM MEMBERS AND FACULTY

- Dr Ivan CK Tam (Faculty Advisor)
 - Dr Mohammed Abdul Hannan (Faculty Advisor)
 - Andrew Ling Kwan Yuen (Captain)
 - Brandon Sim Jiale
 - Neo Xiu Hao
 - Bryan Low Eng Ler
 - Mong Jun Hao
- 

TASK AND CHALLENGES

- Main Design Goals
 - Traverse main route from Kisumu Port to Mbita Point under 3 hours.
 - Carry 200 passengers with capacity for 30 saloon sized vehicles (Bow Loading)
- Other Requirements
 - Ferry maximum draft of 2.5 meters
 - Ferry maximum air draft of 8 meters to allow passage under Mbita – Rusinga Bridge
 - Sea worthy up to Beaufort 6/windspeed 26m/s and Sea State 4 for Lake Victoria passages



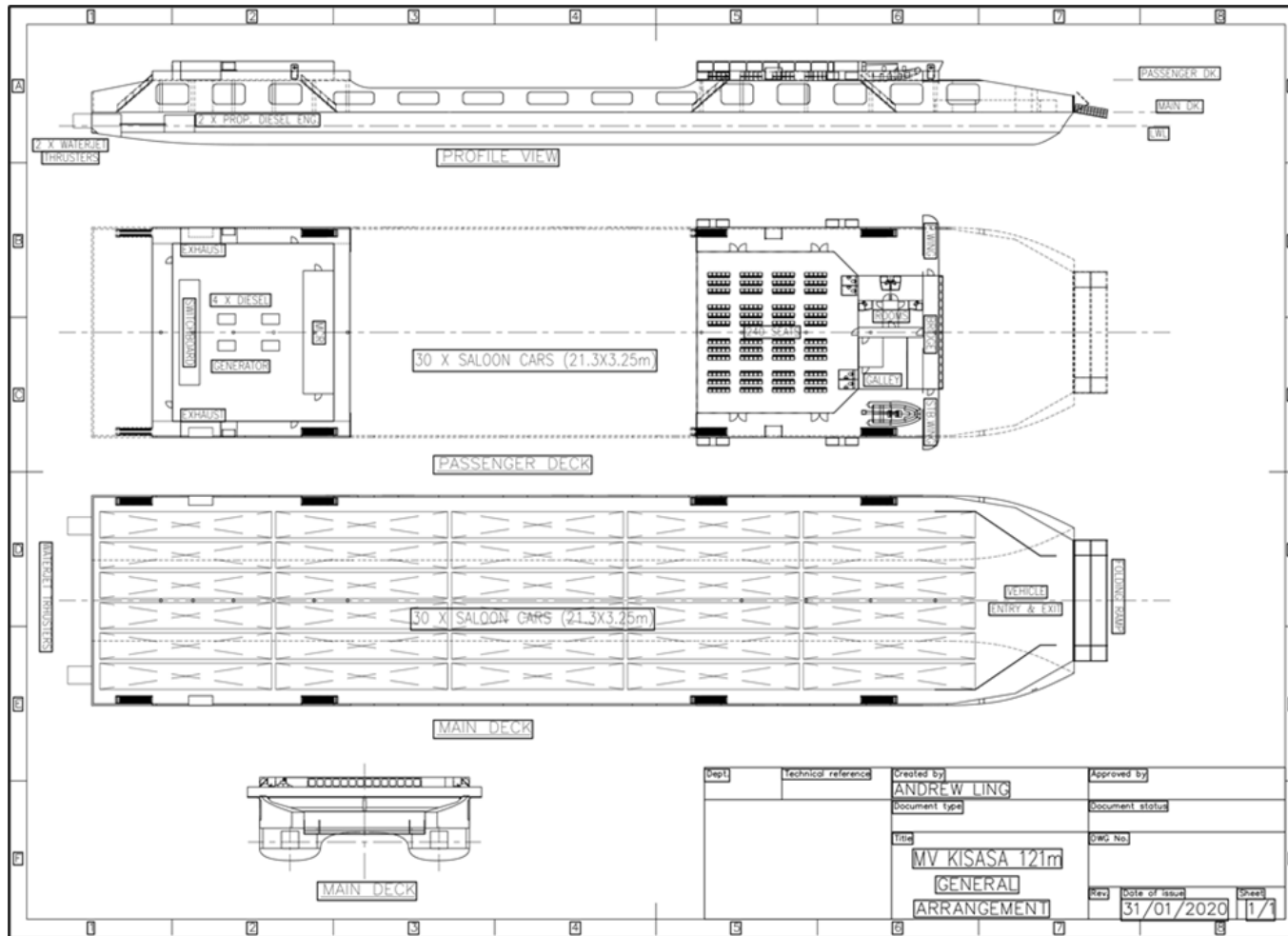


CHALLENGES FACED

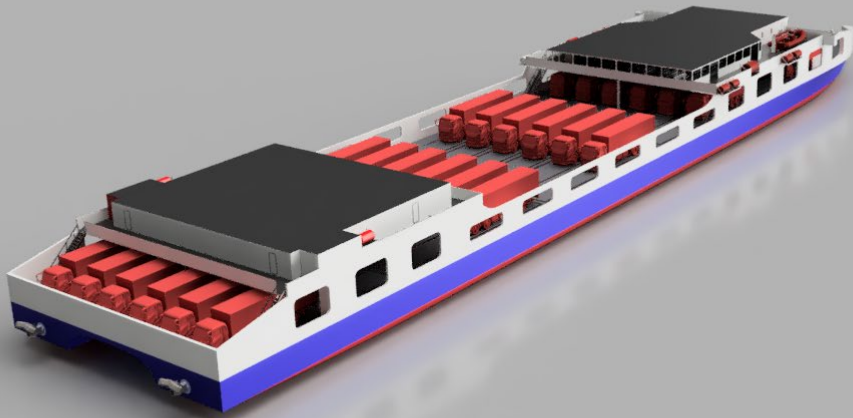
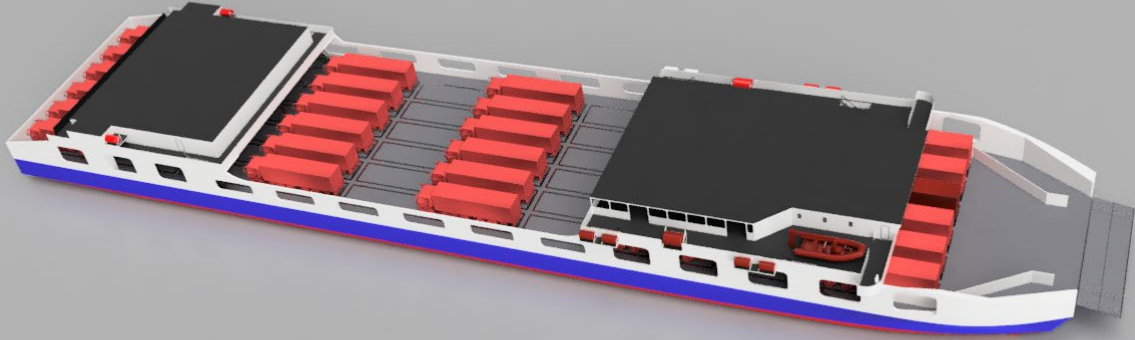


- Generating vessel speed of around 15 – 18 knots to allow ferry achieve service interval under 3 hours with loading and unloading
- Ensuring adequate buoyancy for passengers and cargo without exceeding 2.5 meter draft
- Ensuring bridge visibility with 8 meter air draft
- Reduce risk of ferry capsize
- Optimise passenger safety, comfort and evacuation

MV KISASA GENERAL ARRANGEMENT AND DETAILS



Main Particulars	
LOA	121.77 m
LBP	119.2 m
Breadth (Moulded)	26.0 m
Depth (Moulded)	4.0 m
Design Draft	2.3 m
Max Draft	2.5 m
Air Draft	8.0 m
Cruising Speed	18.0 knots
Lightship	316.53 t
Vehicle Capacity	30 Saloon Cars (21.3 m x 3.25 m each)
Passengers	200
Crew	6
Engine	Caterpillar C3512C IMO II Engine
Power	2551 HP
Propulsion	Waterjet Thrusters
Loading Method	Bow Ramp Loading

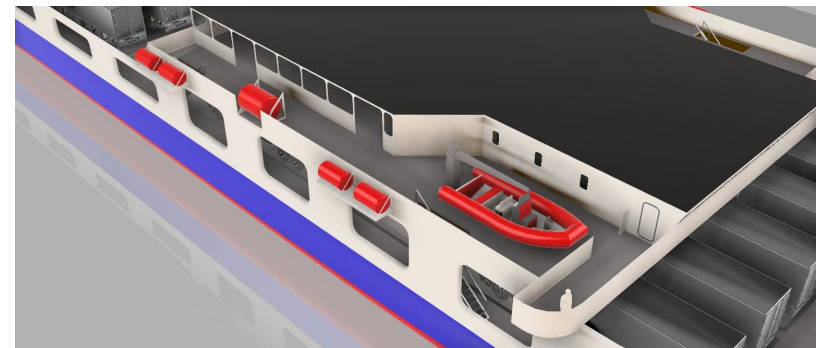
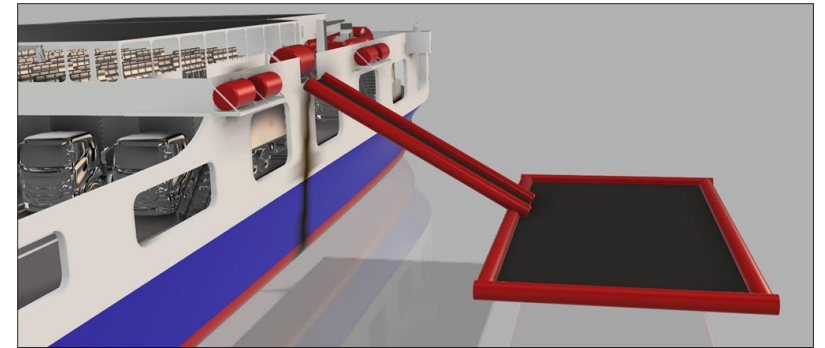
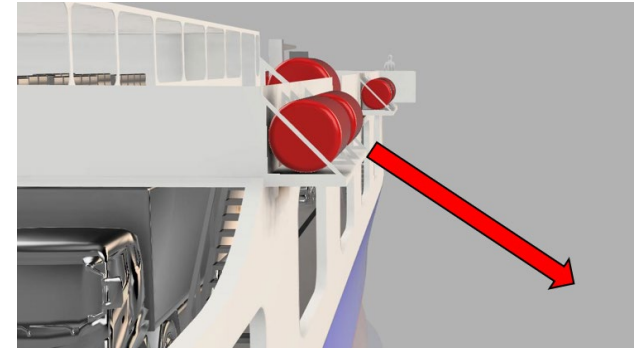


HULL DESIGN

- Displacement catamaran design chosen to reduce hull surface hydrodynamic resistance while maintaining adequate displacement
- Vessel lengthened to 120 meters with breadth of 26 meters to accommodate 30 saloon sized vehicles in 5X6 configuration
- 3 decks (Machinery space, Vehicle/loading deck and passenger and bridge deck)
- Deck above main deck separated into two decks (Passenger/bridge at the bow and the generator room and ECR at the stern)
- High walls with large cut outs on the main deck give wind protection, rigidity as well as adequate ventilation

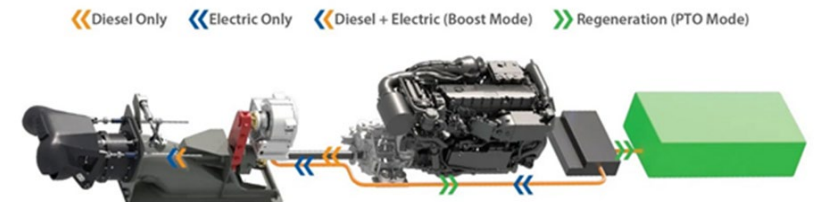
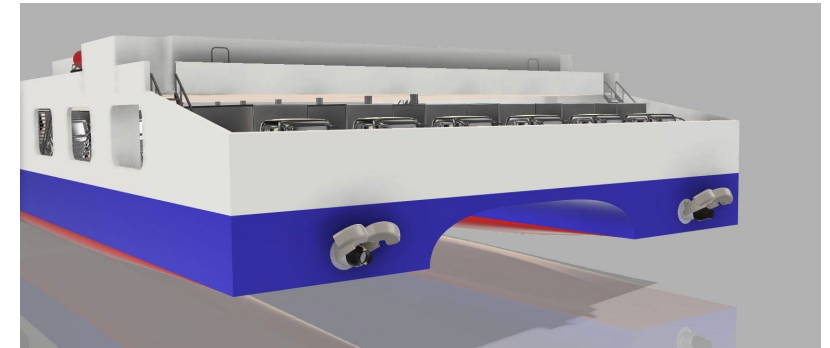
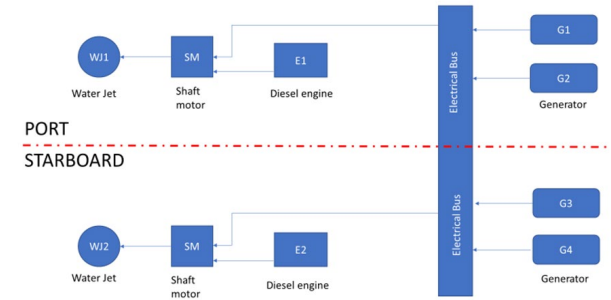
SAFETY AND EVACUATION

- 26 meter breadth with catamaran hull design minimises risk of capsizing
- Meeting the 8 meter air draft also ensures vessel has low centre of gravity
- Engine room, generator and EC rooms located towards the stern away from passenger spaces in the bow
- Generator room and ECR isolated above deck to allow adequate ventilation and reduce of fire spreading
- Life saving equipment uses inflatable slides deployed from the passenger deck to inflatable floats on the water surface for fast, safe and efficient evacuation. Theses systems are located on either side of the ferry.



PROPULSION AND POWERPLANT

- Propulsion system consist of two diesel engines on either side of the catamaran hull coupled to a shaft generator that produces electrical power to a shaft motor that drives the water jet thruster
- The shaft motor can also be boosted by electrical power from the diesel generators above deck to provide additional speed
- The waterjet thrusters allow integration of propulsion and steering eliminating the need for rudders
- Location of diesel generators and ECR above deck allow for ease of servicing and replacement as well as reducing complicated ventilation and exhaust systems
- Electric propulsion allows ferry to be converted to a fully electric vessel running on batteries



LOADING AND UNLOADING

- Loading and unloading ramp allows for simultaneous movement of vehicles and passengers with barriers separating them
- Passenger stairs and passageways on both sides of the ferry allow for simultaneous embarkation and disembarkation with little trouble
- When closed, loading and unloading ramp forms a barrier with the side walls to provide protection from the sea and winds

