UNIVERSITY COLLEGE LONDON

MSC MARINE ENGINEERING SHIP DESIGN EXERCISE 2004

FAST RO/PAX FERRY CATAMARAN

Athanassios VERYKIOS
Emmanuel Manolis PATSOURIS
(*Marine Engineering (Mechanical Option)*)
Sojan VASUDEVAN
(*Naval Architecture*)

Nowadays there is a large demand for faster transportation. There is a 'transportation gap' between the large conventional slow Ro/Pax ferries and the small Ro/Pax fast ferries. The vessel of this design combines all the advantages of the above types of vessels offering similar comfort and facilities as the conventional ferries together with the high cruising speed of 42 knots. It is worth noticing that all the above can be offered in lower ticket prices as the 'costing' calculation will show.

In the operation of fast ferries, quick turnaround is of great importance. It is related to the ability of the vessel to manoeuvre and to her ability to load and unload in a short time. The vessel was equipped with two bow thrusters and together with the aid of a four steerable waterjets, sufficient manoeuverability is achieved. Additionally, there was a proposal for a terminal that enables the simultaneous loading/unloading of the two car decks. Care was given to the design of the vehicle and car decks and the quick transfer of passengers to these passenger decks.

In order for the vessel to achieve the required 42 knots, it was estimated that 44.52 MW effective power is needed. After considering the losses incorporated in the propulsion plant, the required power from the gas turbines was increased to 67MW. To cover the power needed for propulsion, two Rolls-Royce MT-30 simple cycle gas turbines were installed with a maximum power output of 72 MW. Each MT-30 drives a double reduction gearbox with two outputs for the transmission of power to two Lips LJ 164 E waterjets. With the above arrangement, a simple, compact and economic propulsion plant is installed in the vessel, which meets all the requirements.

Power generation is achieved by four WARTSILA 6L20 diesel generators plus one extra emergency generator of the same type. The four main diesel generators are capable of generating 4,100 kW and the emergency set can generate 1,140 kW.

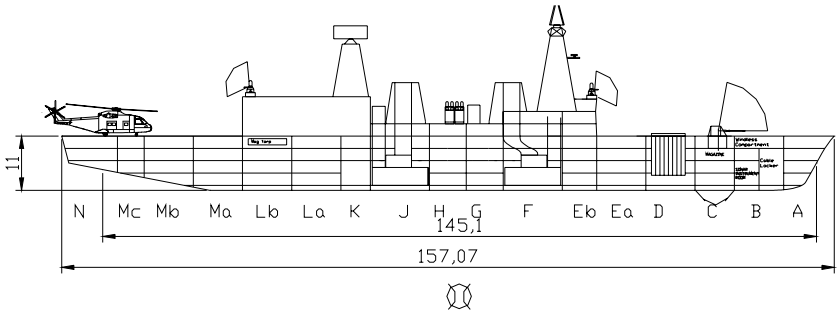
Great care was given to safety during the design. There were four MES (Marine Evacuation Systems) installed on the catamaran together with three lifeboats covering 133% of the passengers. The lifesaving capacity goes beyond the requirement suggested by the regulations.

Fire protection and detection is also an issue that regards the safety of passengers. A combination of new technology fire detection and fighting systems have been used for the accomplishment of the required safety levels for the passengers.

MAIN SHIP FEATURES			
L_{OA}	149.7m	**Prime Movers**	2×ROLLS-ROYCE MT-30
L_{BP}	149m	**Max electric power needs**	3812
$B_{sidehulls}$	7.6m	**Generators**	4× WARTSILA A 20 6L20 (1025kW each) 1× WARTSILA A20 6L20 (1140kW)
B_{ov}	37.4m	**Generator Total Power**	4100 kW
V_s	42kts	**Propulsors (Waterjets)**	4× WARTSILA LJ 164 E steerable
T_{mh}	14.46	**Bow Thrusters**	2×SCHOTTEL ST 550 (900 kW each)
Displacement	5,585tons	**Gearboxes**	2 Double Reduction, Single Input Double Output
$P_{required}$	67MW	**MGO consumption/trip**	145 tons
$P_{installed}$	72MW	**MDO consumption/trip**	4.5 tons
Payload		**Main Auxiliaries**	Air-conditioning, ventilation, lube-oil system, bilge system, fire-fighting, sewage treatment, garbage plant, cathodic protection, engine supporting systems: fuel system
Passengers	1,300		
Cars	498		
Trucks	26		
Complement	60	**Special Features**	Novel loading and unloading system
Journey Distance	401 nm		
Journey Duration	10.2 hrs		
Cost	£86.3M		
In Service Date	2007		

GENERAL PURPOSE FRIGATE (MONOHULL)

LIEUTENANT COMMANDER Ken HILL CF
(*Marine Engineering (Electrical Option)*)
LIEUTENANT Z. BABUR PN
(Naval Architecture)



Need

There is a need to replace the Canada's four ageing IROQUOIS class destroyers with a new General Purpose Frigate (GPF).

Role

The new GPF will maintain the IROQUOIS class Anti-Air Warfare (AAW), Anti-Submarine Warfare (ASW), Area Air defence capabilities. Also provide the capability to operate as part of a multinational coalition force in low-level maritime embargo operations, in mid-level conflict and/or joint operations and provide maritime and assigned air forces able to operate anywhere in the world.

Design Considerations

There is a ceiling cost of $700 (Can) million dollars per ship (£280M UK). Emphasis was placed on reducing through life costs rather than on minimization of fabrication costs during production.

In Service Date

The First of Class is to enter service in 2015. The ships will be built in two batches of four. The first batch is for delivery to Canada, and the second batch for sale to Pakistan.

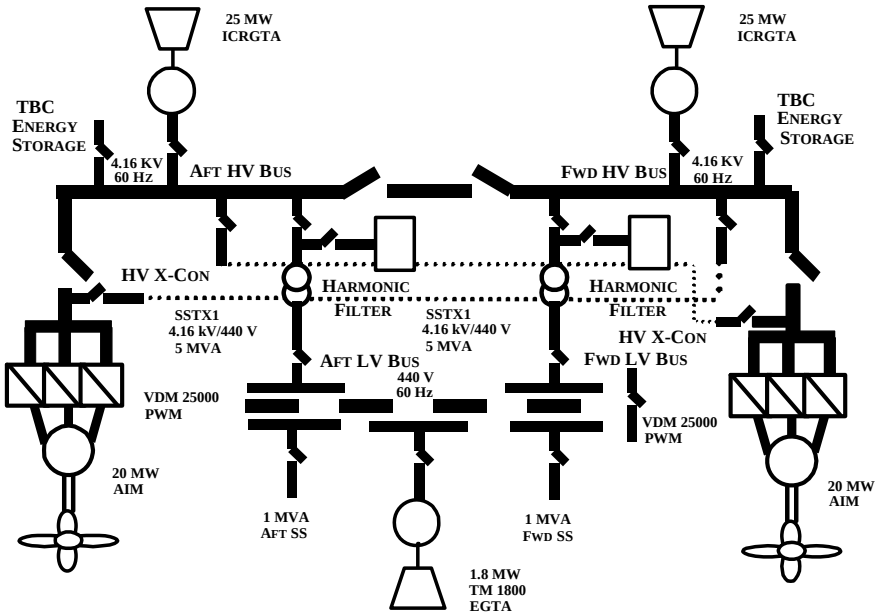
Description

The TRIBAL Class General Purpose Frigate (TCGPF) represents a design solution that will satisfy Canada's maritime need. It will be the heart of the Canada's Navy for the first half of the 21st century. With the ability to conduct operations as a single ship or as the Command ship of a task group the TCGPF offers the flexibility of a general purpose frigate whilst still being able to effectively detect and prosecute multiple AAW threats, provide area air defense, detect and prosecute any ASW, ASuW and asymmetric surface threats. The TCGPF provides unprecedented interoperability with the USN and NATO with a state of the art C4I system and maintains Canada's capability to conduct mid-level NATO joint and

combined operations including STANAVFORLANT, STANAVFORMED and USN CVBG operations. The TCGPF will be able to provide aerial support to tactical amphibious landings and inland strike operations when operating with USN and NATO. The TCGPF will also be able provide shore bombardment when in support of amphibious landings when operation with USN and NATO task forces.

The TCGPF propulsion plant is an Integrated Full Electrical Propulsion (IFEP) system as shown below which constitutes a first for Canadian Shipbuilding and Canadian Forces. The TCGPF has a top speed of 30 knots and a range of 7,500 nautical miles at 18 knots.

The Initial Purchase Cost (ICP) of this design is £287 million. Several design features and circumstances including parallel mid body construction, modular construction and service routes should reduce this figure.



PRINCIPLE FEATURES

Deep Displacement	6,444 Tonnes
Length (Between Perpendicular)	145.1 m
Beam (Extreme)	15.71 m
Depth of Hull	11.00 m
Draught	5.52 m

MAIN CHARACTERISTICS

Number of Ships	8
Endurance	7,500Nm @ 18 knots
Maximum Speed	30 Knots
Cost	£287 million
In-service date	2015
First of Class	HMCS *Hiada*

MACHINERY

IFEP	4.16 kV
Prime Movers	2 x WR21
Converters	2 x VDM 25000
Motors	2 x AIM

CONTROL

IMPS

PAYLOAD

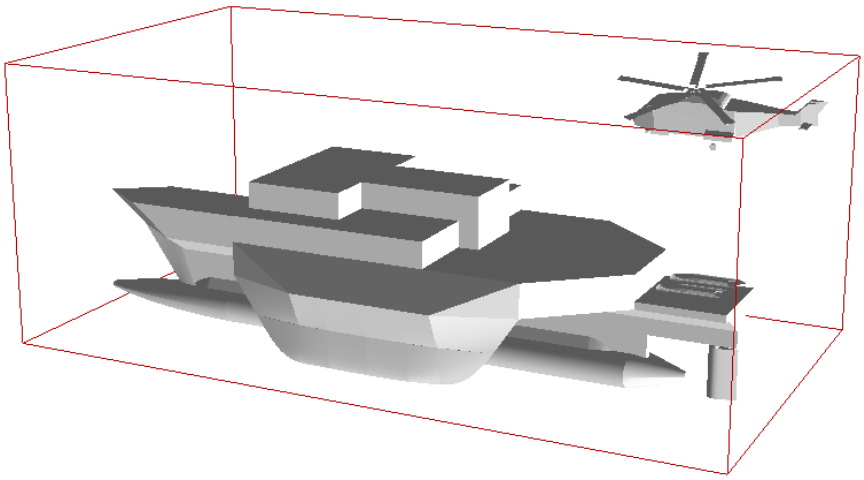
An/SlQ-25 Nixie
MERLIN HM Mk1
Updated SQS 510 Hull Mounted Sonar
Updated AN/SQS-501 CANTASS Towed Array Sonar
Updated CDC AN/UNS-503
Magazine Launch Torpedo System (MK 46)
4 x Shield Mk2 Launcher (Chaff, IR)
NULKA
Updated SLQ501 Intercept (CANEWS)
SLQ 505 Jammer
APAR
SEA GIRAFFE AMB2
Navigation Radar
2 x CIWS – Block 2B
4 x 16 Cell VLS Mk 41 (32 SM Block 2 & 3)
2 x 4 Cell Mk 14 HARPOON Launcher
BOFOR 57 mm MK 3 Naval Multipurpose Gun
DRS SHINCOM 2100
IFF
Data Group Comms (Link)
UHF/VHF/SHF/SATCOM and INMARSAT
GCCS (Global Command and Control System Maritime)
Updated SHINPADS
Tactical Data Information Exchange Subsystem
2 x 16 man ZODIAC
1 NSW RHIB
2 x MAUSER OERLIKON Light Naval Gun System MLG 27

COMPLIMENT

Officers	30
C&PO	38
NCM	90
Aircrew	12
Command Staff	20
Total	**181**

TRISWACH OPV

LIEUTENANT M.R. BURLEY RN
LIEUTENANT J.I. MORLEY RN
(*Marine Engineering (Electrical Option)*)
T. SMITH MoD
(*Naval Architecture*)



The TriSWACH (Triple Hulled, Small Waterplane Area Central Hull) ship is a design concept which aims to optimize pitch and heave stability whilst achieving a waterplane area resistance characteristic somewhere between that of a Trimaran and a SWATH (Small Waterplane Area Twin Hull). This report investigates the applicability of a TriSWACH form to the role of an Offshore Patrol Vessel (OPV). The TriSWACH OPV concept is based upon the increased need to police coastal waters and to offer protection against minor seaborne threats. In response to these threats the roles of the OPV can be defined:

Time of war

Surveillance, patrol and response are the building blocks in obtaining sea control. The OPVs role is to contribute to these tasks within territorial waters and the European EEZ. The OPV should be capable of fulfilling these tasks independently, or where greater response is required it must be capable of seamlessly interfacing with land, air or sea forces, in order to enhance their effectiveness**.**

Time of tension

The role of the OPV is to establish presence within a defined area, either in conjunction with a surveillance task, or as part of a graduated political response to an uncertain or deteriorating situation.

Peacetime

The OPV should contribute to low key operations, policing and fishery protection duties.

The feasibility study was based on providing this capability for a budget of £27.5M, procuring a Class of 3 vessels, First of Class to enter service in 2010, and a design service life of 18 years. It also included a requirement to investigate

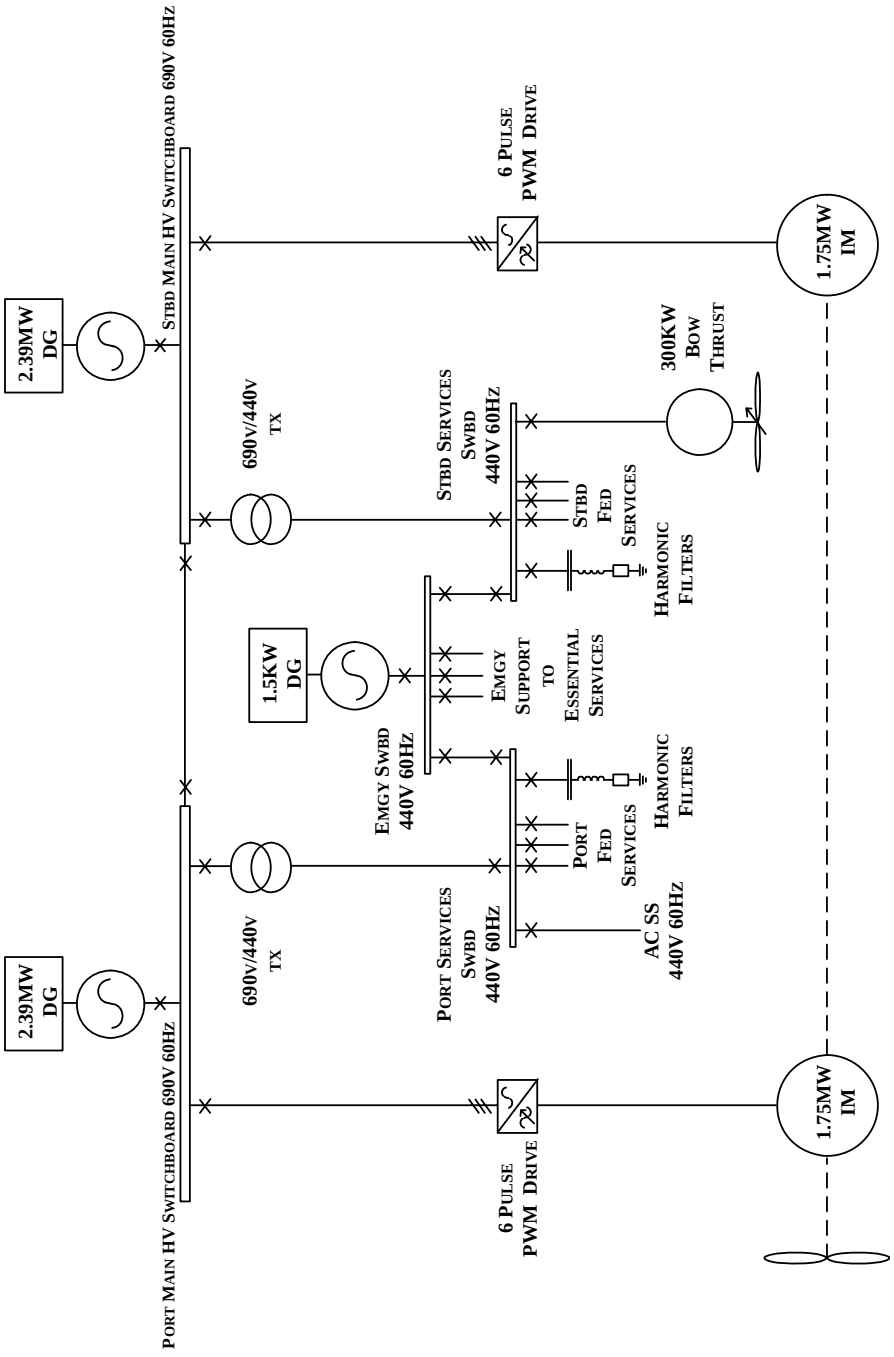
CODAG WARP (Combined Diesel and Gas, Waterjet and Refined Propeller) as an option for the propulsion solution.

The payload options selected to allow the ship to meet its mission requirements included:

- A capability to carry and operate an organic helicopter.
- 20 knots maximum speed.
- 20 mm cannon ASuW weapons.
- 1007.
- ICS3 sensor and communications fit.
- 40 man complement.
- 15 days stores endurance.
- 4 days escort capability at maximum speed.

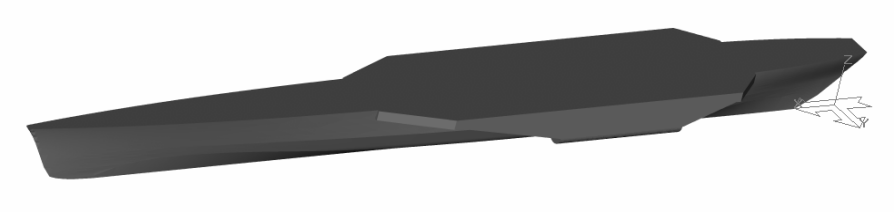
Length Overall (m)	66.7	**Stores Endurance (days)**	15
Beam (m)	27	**Complement**	41 +15
Draught (m)	6	**UPC (£M)**	27.5
Displacement (tonnes)	1,100	**In Service Date**	2010
Max Speed (kts)	20	**No in Class**	3
Endurance @ 12 kts(nm)	4,031		

Main Engines	2 x WARTSILA 8L26 2.39 MW Gensets
Propulsion Motors	2 x GEC 1.75 MW Induction Motors 257 rpm
Propulsion Converters	2 x 1.75 MW 6 pulse PWM
Propeller	WANGENINGEN B 2.75 m diameter.
Max Propulsion Load (MW)	3.5
MAL (MW)	1
ASuW	2 x 20 mm BMATT
Radar	1 x 1007 1 x KELVIN HUGHES 965
Echosounder	1 x KELVIN HUGHES
Communications	ICS 3


2.39MW DG
2.39MW DG
1.5KW DG
PORT MAIN HV SWITCHBOARD 690V 60HZ
STBD MAIN HV SWITCHBOARD 690V 60HZ
690V/440V TX
690V/440V TX
6 PULSE PWM DRIVE
6 PULSE PWM DRIVE
1.75MW IM
1.75MW IM
300KW BOW THRUST
STBD SERVICES SWBD 440V 60HZ
PORT SERVICES SWBD 440V 60HZ
EMGY SWBD 440V 60HZ
EMGY SUPPORT TO ESSENTIAL SERVICES
STBD FED SERVICES
PORT FED SERVICES
HARMONIC FILTERS
HARMONIC FILTERS
AC SS 440V 60HZ

DYNAMICALLY ASSISTED LITTORAL COMBAT SHIP (TRIMARAN)

LIEUTENANT Neil BENSTEAD RN
LIEUTENANT Penny MOUNTFORD RN
(*Marine Engineering (Electrical Option)*)
LIEUTENANT Steve GILLESPIE RCN
Kai JIANG
(*Naval Architecture*)



Introduction

The Littoral Combat Ship (LCS) (Dynamically Assisted) is an investigation into a new type of vessel to be used in littoral warfare. It is similar to that already envisaged for use by the USN through the placement of contracts with industry to investigate the Littoral Combat Ship (LCS) concept, with a view to the purchase of a fleet of up to 60 such vessels. The concept has developed through the change in attitudes to modern warfare. Conflict is likely to occur anywhere in the world, which may require a vessel (or vessels) to operate very close in to the shore (the littoral), whilst having the ability to move at high speed and counter a number of simultaneous threats.

Concept of Operation

Primary Roles:

- Prosecution of small boats, surveillance and reconnaissance.
- Mine counter measures.
- Littoral ASW.

Secondary Roles:

- Intelligence.
- Homeland defence.
- Special Operation Forces support.
- Logistic support for movement of personnel and supplies.

The LCS has been developed through the requirement for a multi-role vessel to operate where it would be unwise for a large single-mission vessel to operate. The LCS must be capable of completing several missions, either alone or in company with a Battle Group, and must therefore have the latest communications, data links and sensors fitted. The operation of the vessel will include the roles outlined above, and hence it must be capable of high speed operation, whilst also being able to conduct ASW/Mine Countermeasures operations, for example. It is therefore essential that signatures are minimized wherever possible. The vessel is intended to be multi-role, and therefore equipment over and above the baseline fit will be modularised. This concept enables the role of the vessel to be changed quickly, for example from AAW to ASuW. Such an arrangement would be facilitated through a forward basing arrangement for the vessel. The high speed capability enable fast relocation of the vessel, whilst the slow speed propulsion arrangement allows for efficient low speed operations.

Key Features

PRINCIPAL CHARACTERISTICS

In Service Date	2007
Number of Class	60 expected
Cost	US$223 million
Displacement Light / Docking (tonnes)	2,027/2,014
LBP/LOA (m)	131.9/138.9
Beam overall/Waterline (m)	17.6/9.54
Draught Light / Docking (m)	4.5/4.47
Depth (m)	9.5
Max Speed (kts)	50
Propulsive Load/Service Load (MW)	54/2.8
Endurance (fuel) (nm@ 50kts)	1,149
Endurance (fuel) (nm@ 18kts)	4,565
Endurance (stores) (days)	14
Hull Life (years)	30
Complement (Core)	60
Complement (Embarked SoF)	15

PRIME MOVERS

1 x MT50 (50MW GT)
1 x AG9140 (2.6MW GT)
2 x TF100 (7.5MW GTs)

PROPULSORS

1 X KAMEWA 255 Waterjet (50 MW)
2 x KAMEWA 140SII Waterjet (7MW)

TRANSMISSION SYSTEM

MT50 drives into a double reduction double helical 12:1 reduction gearbox, driving 50MW waterjet.

ELECTRICAL POWER & DISTRIBUTION

TF100 and AG9140 GTAs provide power to electrical distribution system.

ELECTRIC DRIVE

7MW PWM converters and 7MW Induction Motors drive 140SII waterjets.

AUXILIARIES

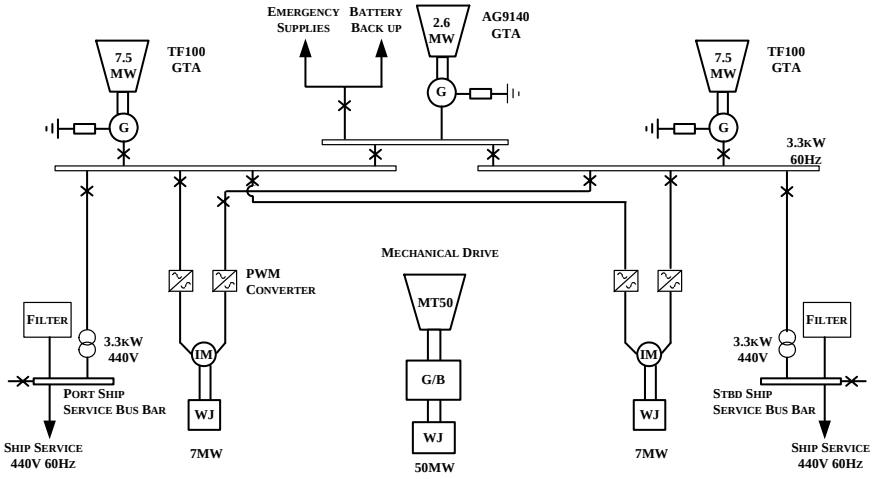
3 x CW Plant.
2 x RO Plant
2 x Refrigeration Plant
3 x HPSW Pps
6 x LPSW Pps
2 x HPACs
2 x LPACs

MAIN PAYLOAD AND WEAPONS

4 x 20mm Guns
1 x 57mm Gun
Anechoic Tiles
Torpedoes
Sonar
RAM
CIWS (Vulcan PHALANX 1B)
ESM
Basic Stealth
Decoys/NULKA/Torpedo Defence

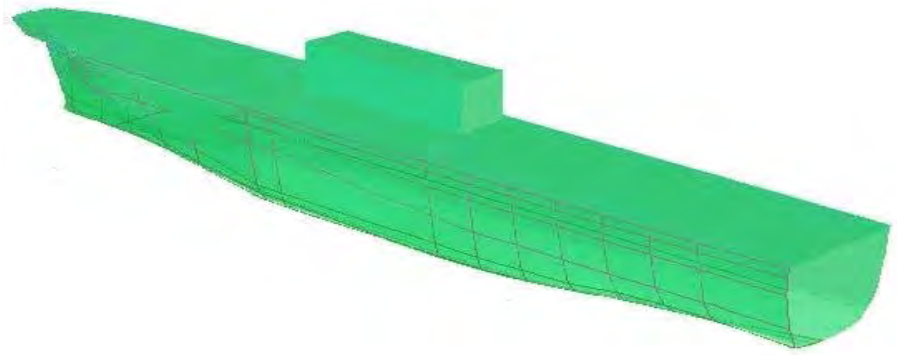
Aircraft	2 x AH-58D Helicopters

Propulsion System



AMPHIBIOUS DEPLOYMENT SHIP (ADS)

LIEUTENANT David BEADLING RN
(*Marine Engineering (Electrical Option)*)
LIEUTENANT Robert CUMMING RN
(*Marine Engineering (Mechanical Option)*)
LIEUTENANT (N) Duane FANDREY CF
Nic BRADBEER
(*MSc Naval Architecture*)



Introduction

Since the breakdown of the Warsaw Pact, the single threat posed by the bi-polar nature of the world political climate has been replaced by a more varied and less defined threat. The new threat is characterized by unpredictability, both in nature and geographical location. This means that there may be a need for rapid reaction anywhere in the world at any time. The only way to deal with such a threat is to respond with effective force quickly. The Strategic Defence Review (SDR) recognized this and, therefore, the need for a flexible reaction force capable of rapid deployment to any theatre of operations. In turn this resulted in the

formation of the UK Rapid Reaction Force comprising elements of all three Services.

The change in perceived threat and naval the naval role within it has recently caused the Royal Navy to bring into service two new classes of ship, the ALBION and OCEAN classes. The role of these new vessels is transporting sea and air borne assault forces respectively to the required area of operation for rapid insurgence. The introduction of these vessels naturally raises the notion of a vessel, which is still more flexible and is capable of both roles. Being able to support both air and sea borne assaults either separately or together would be a move toward maximizing the effectiveness of any response to the new asymmetric threat.

Role

The primary role of the ADS is to transport a full assault company of Royal Marines and there associated equipment to the required area of operations. When in theatre the ADS will act as the Command and Control centre as well as supplying logistical support to the Royal Marines once they are established ashore. In peacetime the ADS will provide a valuable platform for training officers and ratings of the future RN.

Threat

When in transit to theatre, the fully laden ADS would be a valuable unit and as such would require protection at all times in the form of escorts. Due to the nature of her operations she will only be fitted with a self-defence weapons system.

Amphibious Operations

Time at risk is a big driver for the amphibious operations of the ADS. Therefore the time spent docked down is kept to a minimum and the ADS employs methods and technology to dock down currently used by the submarine fleet with water admitted to ballast tanks via flood valves and vents. Water will be expelled from the ballast tanks using a Low Pressure Air blow system should the need arise for a rapid de-ballasting be required. Once docked down a ballast system would be used to fine trim the ship. Embarkation of vehicles and equipment will be similar to that of a Roll On Roll Off ferry allowing a rapid and simple embarkation.

An assault will consist of a helicopter assault with 12 MERLIN EH101 with a seaborne assault using 4 Mk 10 LCVP and 4 LCVU.

Payload

The ADS is designed to carry 12 MERLIN EH101 Helicopters, 50 Equivalent BEDFORD trucks (some of which may be replaced with battle tanks), 20 TEU containers and 692 Officers and men of the Royal Marines.

Machinery

A Fully Integrated Electric Propulsion System is fitted with two WR21 25MW Gas Turbine Alternators (GTAs) supplying the propulsion system and loads simultaneously. In addition, 2 harbour GTAs are fitted, which would be capable of supplying the harbour load, with an additional Emergency GTA being fitted to supply essential loads in the event of a total loss of power. The Main propulsion is supplied by 2 Advanced Waterjets (AWJ-21) driven by Advanced Induction Motors (AIM) and Pulse Width Modulated Converters (PWM). The advanced Waterjets also provide steering and are fully reversible and this ensures that the ADS possess good manoeuvring capabilities. Low speed propulsion and station

keeping during amphibious operations are provided by 3 SCHOTELL Pumpjets, 2Aft and 1 Fwd. The pumpjets have a 360° directional thrust and therefore also fulfil the role of stern and bow thrusters. The Electrical Distribution System has been designed to allow a great deal of flexibility and redundancy, whilst also allowing maintenance to be conducted without disruption to other hotel supplies. The ballast system comprises of a series of internal tanks and 6 ballast pumps contained in a ballast pump room.

Key Features

PRINCIPAL CHARACTERISTICS

Cost	£375 Million
Displacement Light.(tonnes)	15,500
Deep Displacement (tonnes)	21,400
Length OA(m)	215
Beam WL(m)	25.7
Draught Mean (m)	6
Depth (m)	22.9
Speed (kts)	24 Knots
Endurance @15 Knots (Fuel)	14,400 NM
Endurance (Stores)	90 Days
Hull Life (Years)	30 Years
Complement	
Ships Company	374
Royal Marines	692
Air Crew	216
Propulsive Power	54.4MW
Service Load	5.5MW

PROPULSORS

2 x AWJ-21 Adv Water Jets (25MW Each)
3 x SCHOTELL SPJ320 Pumpjets (2.2MW)

PAYLOAD

Royal Marine Commandos	692
Lane Meters for Vehicles	400
TEU Containers	20
MERLIN Medium Lift Helicopters	12
LCU Mk10 Landing Craft	4
LCVP Mk5 Lightweight Landing Craft	4

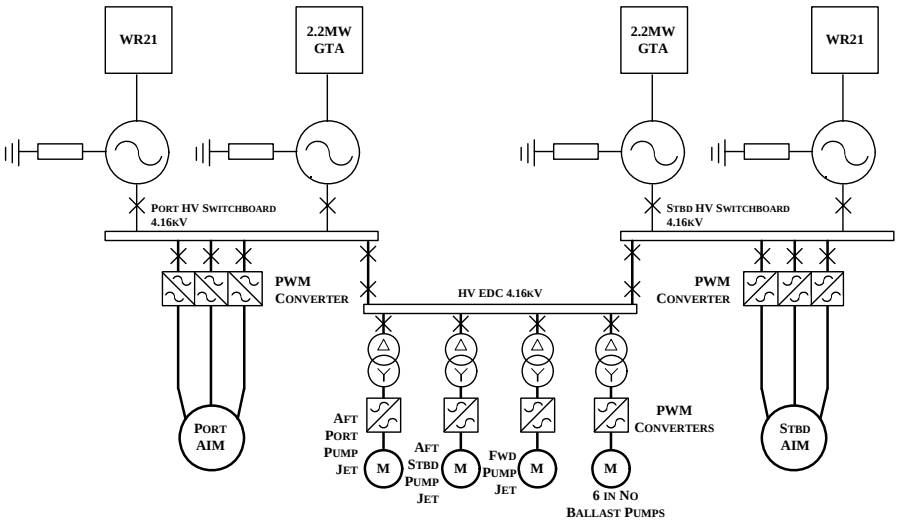
WEAPONS

C3 Command and Control Suite	1
SIGNAAL Goalkeeper CIWS	3
NULKA Decoy System	
UAT ESM System	

PROPULSION

WR21 GTAs (25MW each)	2
TURBOMECHA GTAs (2.2MW)	2
TURBOMECHA GTA (1.8MW)	1
Adv Induction Motors (30MW)(AWJ Drive)	2
Induction Motors(2.5MW) (PumpJet Drive)	3

Electric Propulsion System



FAST LAND ATTACK FRIGATE

LIEUTENANT M.L. THOMSON RN
(*Marine Engineering (Electrical Option)*)
A. BARATTE
M. KING
(*Naval Architecture*)

Introduction

The Fast Land Attack Frigate (FLAF) is a modern, flexible platform enabling maritime power to be effectively projected world-wide in defence of the UK's interests. The FLAF concept is that of a capable main vessel, incorporating modularity concepts in its design with several off board systems, including two modular fast support craft, embarked aircraft and unmanned vessels to provide unrivalled flexibility and an ability to respond to a variety of threats in a graduated manner. FLAF will be a dominant and persistent platform with a global reach and ability to project lethality into the littorals and ashore.

Roles

The role of FLAF is primarily a land attack ship, capable of prosecuting a variety of land targets in support of allied operations. However, like all frigates it is expected to be able to carry out a variety of general operations globally such as peace keeping and disaster assistance. Specifically the roles of FLAF can be split into three broad categories:

- Sea control.

- Projection of power ashore.
- Naval presence.

Threat

The collapse of the USSR in the early nineties shifted the emphasis of maritime operations away from doctrine to support open ocean warfare to that of fighting in the littorals. Most areas of instability in today's world centre on cities, 75% of which are within 150 miles of the coastline. Thus naval forces with a land attack capability can have a large leverage on political events through their ability to impact events on the ground. The main threat of the future is from 'rogue states' and terrorist groups engaged in asymmetric warfare in littoral regions. Therefore a flexible ship is required, capable of deploying independently to littoral regions around the globe. It should then be capable of operating independently or as part of a task group and must have the flexibility to respond to existing and emerging threats within a thirty year life span.

General

FLAF will be built in batches of three, the first of which is to be in service by 2015 and have a 30 year hull life. The unit production cost is to be £280 million. The vessel will require a top speed of 25 knots and an endurance of 7,000 nautical miles at 20 knots. Particular emphasis is to be placed on the reduction of Through Life Costs and the use of fuel cells to provide a loiter capability is to be investigated. An emphasis is to be placed on the use of up to date technology.

PAYLOAD

'A' Navigation Radar
'D' Multifunction Radar
EO Sight
Integrated Technology Mast
Type 2050 Hull Mounted Sonar
Electronic Warfare Suite
1 x IFF Transponder
2 x Decoy systems (Chaff and Nulka)
Echo Sounders, underwater telephone equipment
155mm Naval Gun
6 x mk41 VLS (8 Cells)
2 x 20mm Cannon
2 x PHALANX CIWS
2 x UAV
2 x LYNX or 1 x MERLIN Helicopters
2 x Fast Craft, equipped with:
    'A' Navigation Radar
    EO Sight
    20 mm Cannon
    Mission Module (6,000kg, $6m^3$, £1M)
    2 x Missile Boxes, 2 missiles each (HELLFIRE or BOFORS RBS 70 cabable)

Machinery

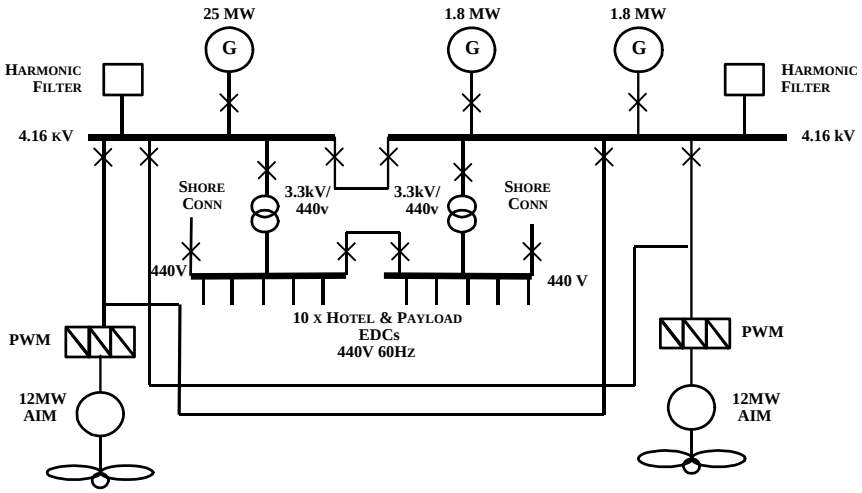
Propulsion and electrical generation is provided by an Integrated Full Electrical Propulsion system with 3 Gas Turbine Alternators (GTAs) supplying both propulsion and service electric loads. A single 25 MW WR21 GTA is the main source of propulsion across the full operating profile, with two 1.8 MW TURBOMECA GTAs as standby engines, providing power whilst alongside, at anchor and during planned maintenance or failure of the WR21 at sea. The

TURBOMECA GTAs also act as emergency diesel generators. Single generator operation will be employed with ride through capability for essential services supplied by dedicated batteries. Propulsion is achieved with twin shafts and fixed pitch propellers, powered by 12MW Advanced Induction Motors (AIMs), driven by Pulse Width Modulation (PWM) drives. Auxiliaries include 4 chilled water plants, 2 HP Air Compressors, 2 LP Air Compressors, 2 Reverse Osmosis plants, 4 HPSW pumps, 4 LPSW pumps and an IMO sewage treatment plant. The propulsion plant of the Fast Craft consists of two 1.5MW RTM322 helicopter gas turbines, directly driving 2 x ROLLS-ROYCE KAMEWA FF550 Waterjets through a single reduction gearbox. Minimal auxiliaries are powered by a diesel generator.

KEY FEATURES

	FLAF	**FAST CRAFT**
Deep Displacement, ∇	5,996 tonnes	30.31 tonnes
Waterline Length, L_{WL}	145m	18.3m
Waterline Beam, B_{WL}	17.6m	4.69m
Draught, T	5.13m	1.0m
Hull Depth, D	12m	2.2m
Top Speed	27kts	55kts
Endurance	7,000nm at 20kts	450nm at 30kts
Complement	179/rising to 210	4 (with up to 15 SF embarked)

Electrical Propulsion System Configuration



Fast RO/PAX Ferry Monohull

Ioannis PAPADOPOULOS
(*Marine Engineering (Mechanical Option)*)
Nikiforos PARSALIDIS
(*Marine Engineering (Electrical Option)*)
George PAPAGIANNOPOULOS
(*Naval Architecture*)

Ferries are vessels with a capability of carrying a wide variety of cargoes (i.e. passengers, vehicles, etc.) on various sea routes, hence proving a competitive alternative, in the transfer of goods and people. The vessel designed is a fast monohull Ro/Pax ferry, with a service speed of 40 knots and payload capacity of 1,800 passengers, 300 cars and 35 trucks. The selected route of operation is the Pireaus–Heraklion route, with high commercial traffic in both high and low seasons.

One of the driving parameters in the efficient operation of passenger ships is its manoeuvrability and hence reduced turn around times in port. The vessel is therefore equipped with two bow thrusters and with the additional aid of four steerable waterjet units, sufficient manoeuvrability is achieved. Simultaneous loading and unloading procedures are allowed, as a means of further reducing their duration. Consideration is also given to ensure the satisfactory flow of passengers, in emergency conditions.

In order for the vessel to achieve 40 knots cruising speed, three ROLLS-ROYCE Marine TRENT MT-50 gas turbines are installed, with a maximum power output of 150 MW. Each MT-50 drives a double reduction gearbox with three outputs for the transmission of power to three 325 KAMEWA waterjets. Hence an efficient and relatively lightweight propulsion plant is installed in the vessel which meets all the requirements.

Power generation is provided through four DEUTZ TBD 620V12 diesel generators plus one emergency generator of the same type. The four main diesel generators are capable of generating 5,000 kW of power, with the emergency capable of generating 1,250 kW.

All evacuation arrangements and fire fighting systems are designed in accordance with international regulatory bodies, such as SOLAS and MARPOL. Therefore, four life rafts are installed onboard the ship (each with a 150 people capacity), at forward and after positions in addition to thirty-five life rafts (each with a capacity of 35 passengers) located at the sides. Finally, a fast rescue boat is installed onboard to assist in passenger rescue missions.