



a total stealth concept

COMMERCIAL SHIP DESIGN

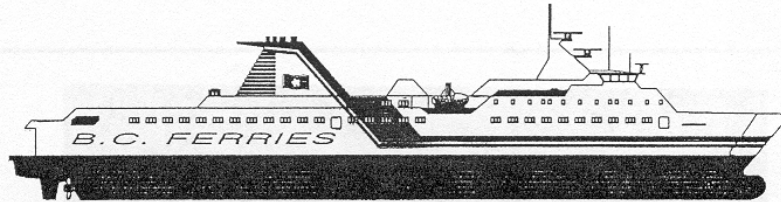
COMMERCIAL SHIP DESIGN

MIL Systems has designed a number of commercial ships and is fully conversant with the various commercial regulatory bodies' requirements such as Lloyd's Register, etc. In fact the ISO 9001 certification program of MIL Systems was designed against Lloyd's Register Quality Branch standards.

These commercial designs cover both small and large craft covering small fast customs patrol craft and specialized high speed sounding vessels to very large RO-RO passenger and vehicular traffic open seas ferries. Some of the latter include:

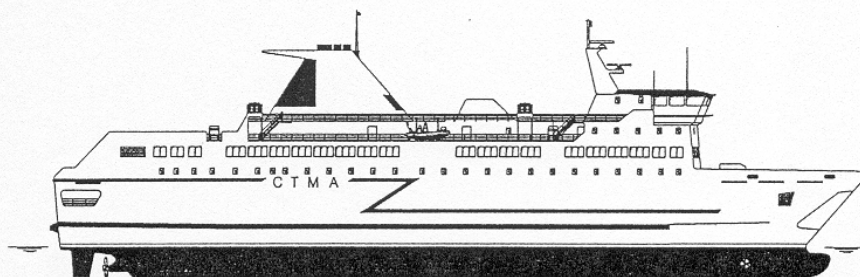
1989	PEI ferry	RO-RO 150 cars, 500 people
1992	CTMA ferry	RO-RO 150 cars, 600 people
1995	" BC Ferries " ferry	RO-RO 180 cars, 500 people





*130 m RO-RO ferry to service Port Hardy to Prince Rupert, B.C.
180 cars & 500 people*

MIL  Systems



*110 m RO-RO ferry to service PEI from Ile de la Madeleine (CTMA)
150 cars & 600 people*

MIL  Systems



Solving Your Small Craft Problems

- Design and Production Packages
- Hull Design and Fairing
- Stability, Powering and Seakeeping
- Structural Design and Optimization
- System Design
- Noise and Vibration Control
- Human Engineering
- Interior and Exterior Design
- Reliability Analysis
- Warranty Usage Estimates
- Maintenance and User Manuals

Premier Facilities

MSEI, Canada's premier marine consultancy, has the staff and facilities to answer your most complex questions or to develop your most innovative ideas.

Diverse Experience

MSEI's engineers, designers and specialists provide a broad range of marine related expertise to ensure complete and timely solutions to wide ranging problems.

Advanced Marine Vehicles

MSEI's involvement in high technology projects ensures state-of-the-art knowledge of:

Displacement mono-hulls

Displacement multi-hulls

Planing mono-hulls

Planing multi-hulls

Surface Effect Ships

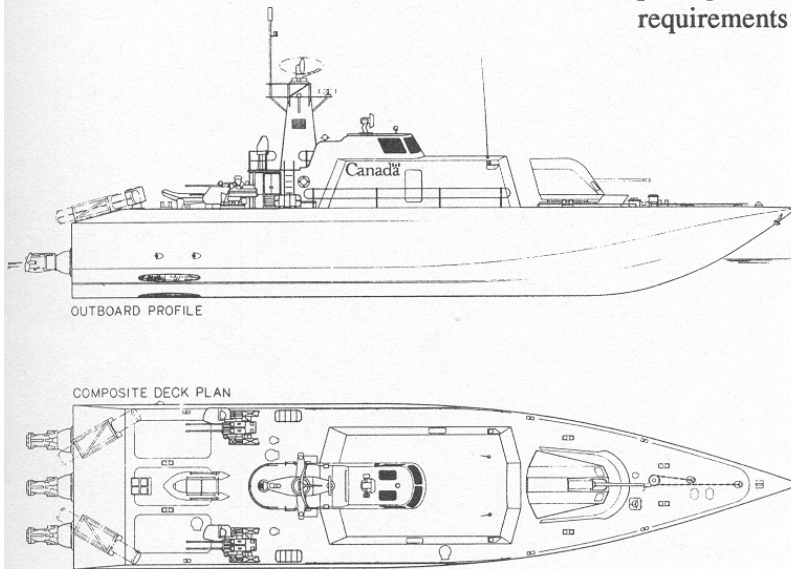
and Hydrofoils

Financing

MSEI can provide a number of very flexible financing options for consultancy services. For longer term Research and Development activities Government funding of consultancy services is often available.

Design and Production Packages.

- ☐ Complete design and production packages based on owner or builder requirements:

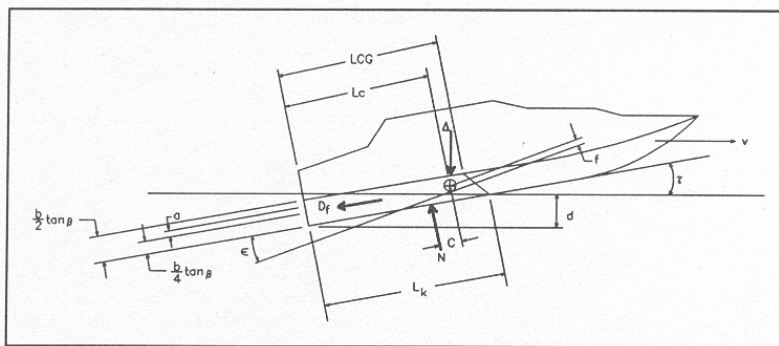


- Hull Design
- Structural Arrangement
- Machinery Selection
- Interior Design
- Electronics Package
- Production Drawings
- Production Engineering
- Building Specification
- Costing

Stability, Powering and Seakeeping

- ☐ Full range of hydrodynamic and hydrostatic characteristics and recommendations.

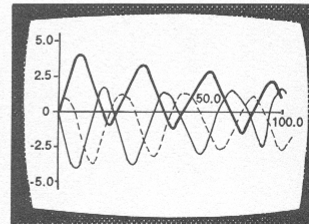
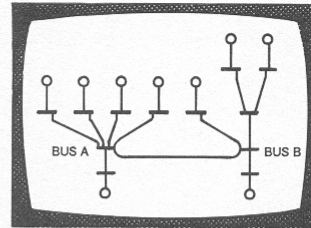
- Speed-Power Predictions
- Ride Characteristics
- Stability Evaluation
- Model Testing





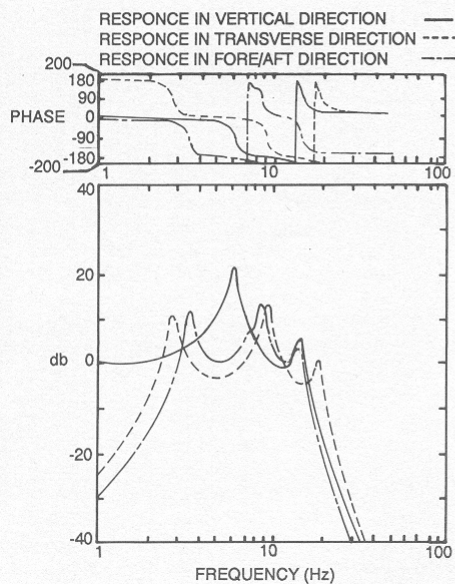
System Design

- ☐ Marine engineering, electrical and electronic expertise
 - Machinery Selection
 - Machinery Installations
 - Pipe System Analysis
 - Wiring Diagrams
 - Electrical Load Analysis
 - Fault Current Analysis
 - Pollution Abatement



Noise and Vibration Control

- ☐ This major concern for small boat passengers and environmentalists can be minimized by careful design and installation



- Machinery Selection
- Silencing
- Machinery Vibration Mounting
- Bulkhead and Deck Treatments
- Acoustic Enclosures



HIGH SPEED SOUNDING VESSEL

Accurate and Fast Survey

The High Speed Sounding Vessel is designed to conduct accurate channel and bottom surveys in estuaries and rivers at speeds up to 18 knots.

The vessel is configured on a catamaran platform and equipped with a rapid deployment boom system providing for a sounded sweep width of 25 metres (82') overall.

The round bilge semi-displacement catamarans hull form provides for economic propulsion based on high speed diesel engines driving submerged propellers through a vee drive gearbox.

The vessel, which can operate at 20 knots and in significant waves of 2 metres (6'-6"), has been approved by Lloyds Register of Shipping and the Canadian Coast Guard.



The vessel has provision for the deployment of an additional sonar transducer from the crossbridge and is equipped to support secondary roles such as; Navigation Aids Maintenance, Search and Rescue and Pollution Cleanup.

The vessel is provided with a dedicated sounding room and accommodation for four personnel, permitting autonomous operation.

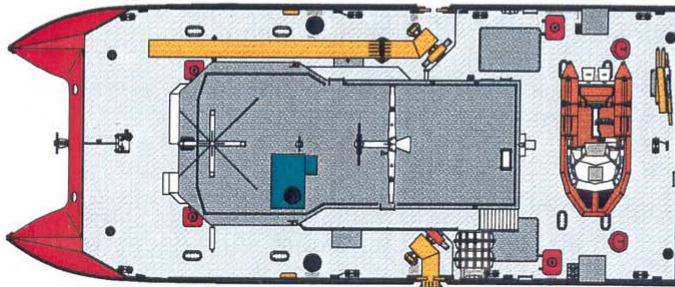
Length, overall:	23.0 m (75'-6")
Length, waterline:	21.5 m (70'-6")
Beam, overall:	9.4 m (30')
Width booms extended:	25.0 m (82')
Displacement:	82 tonnes (81 tons)
Speed maximum:	21 knots
Speed sounding:	18 knots
Range at 20 knots:	600 miles



HIGH SPEED SOUNDING VESSEL

Features

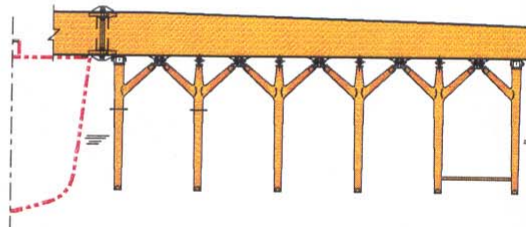
- Aluminum Hull and Superstructure designed to LRS Requirements
- Portable plates for LRS High Speed Catamarans machinery removal



- Crane for boat handling and secondary task support
- Spacious working deck and all round access

- Built-in vessel lifting points
- Integrated Bridge with Electronic Chart, GPS, DPGS Array deployment and Hydrographic Radio Boom
- Single movement, hydraulically actuated boom system, stowed within vessel envelope in less than 2 minutes
- Auxiliary power provided by two diesel generators with battery back-up and UPS
- Deck machinery powered by a central electro-hydraulic power pack

- Compact light weight aluminum box girder sounding array deployment boom



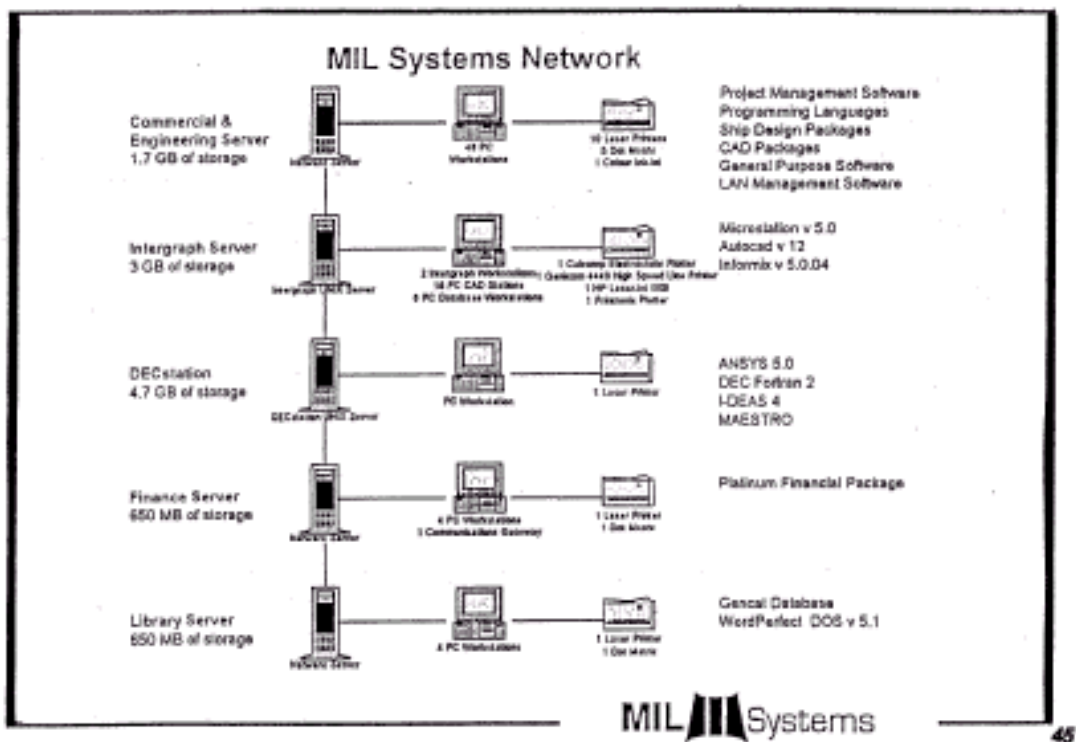
- Aluminum and composite transducer struts on the boom incorporating frangible joints at connection points



HIGH TECHNOLOGY DESIGN & DRAWING OFFICE

HIGH TECHNOLOGY DESIGN & DRAWING OFFICE

In 1949 design & draughting were accomplished with slide rules and drawing boards. As time progressed so did technology, and the computer revolution drastically affected the way in which work could be done, both for design and draughting. MIL Systems progressed through centralized mainframe computers to the present day where each engineer and draughtsman has his own Personal Computer, all of which are networked to ensure that each draughtsman, for example, is working on the latest revision of the drawing and that each Cost Account Manager is aware of the progress of his work both with respect to schedule and cost. The diagram below shows the essence of that integrated computer relationship currently in use at MIL Systems and that the drawing presentation format is DND's preferred INTERGRAPH.





6. PROGRAM MANAGEMENT

Section 6

PROGRAM MANAGEMENT

Modern Program Management is an essential element for successful management of business, and must integrate Work Break-down Structure, Cost Account management, Cost / Schedule reporting, and meaningful work variance recovery plans and actions.

Today, this means integration of software in high speed computers, accessed by both CAM's and Financial personnel using a common database to ensure all "users" have access to the latest status of the project data.



COST / SCHEDULE CONTROL SYSTEM

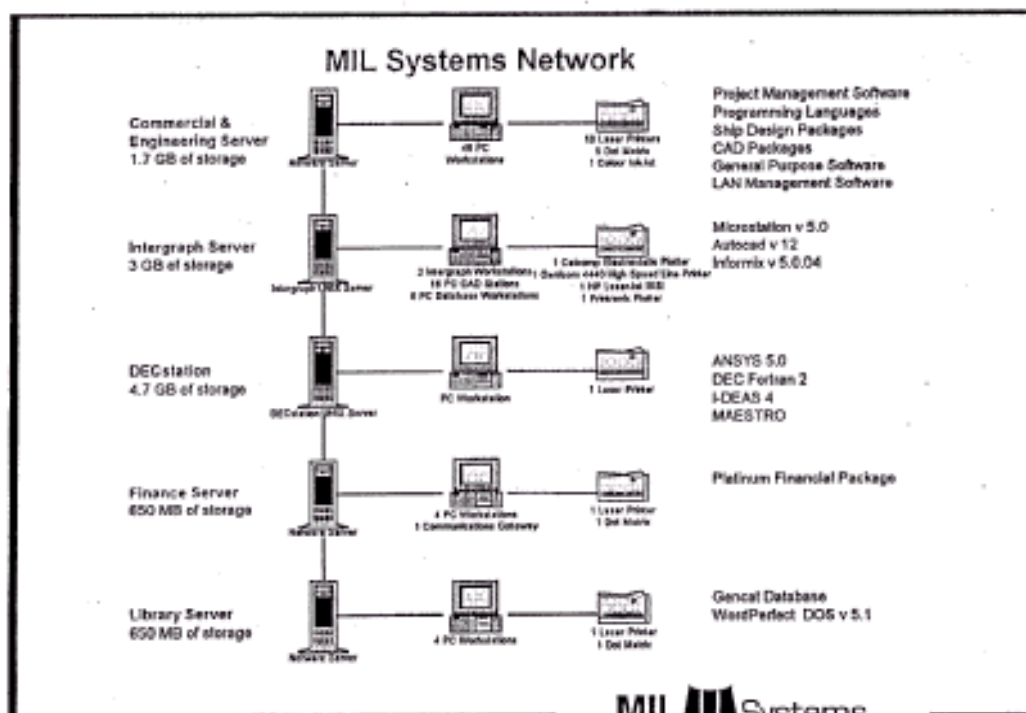
1987 DODi 7000.2 implemented for CPF & TRUMP

1990 DODi 7000.2 certification by LITTON

1994 ongoing member of Government / Industry
Steering Group on :

COST/SCHEDULE PERFORMANCE MANAGEMENT

1995 ISO 9001 certification by Llyd's Register Quality Branch
of MIL Systems' version DODi 7000.2 using
"integrated financial and work performance" software.



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7. PREVIOUS DISCUSSION PAPERS

Section 7

PREVIOUS DISCUSSION PAPERS

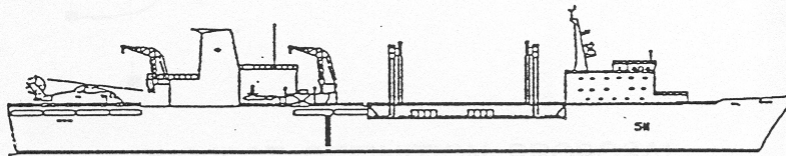
MIL Systems has habitually offered discussion papers to DND relating to enhancing the Navy's efficiency. Some examples are :

- 1988 - new AOR design*
- 1989 - steam destroyers' Y100 plant desk*
 - new MCDV design*
- 1990 - signature management (RCS)*
 - establish RCS measurement facility*
 - measure RCS of 3 W. Coast ships*
- 1993 - submarine AIP using PEM fuel cells*
 - Multi Role Support Ship (SMART)*
- 1994 - engineering services to DGMEM*
 - drawing office support*
 - steam warship support desk*
 - TSRV class support*
 - In Service Support of CPF*



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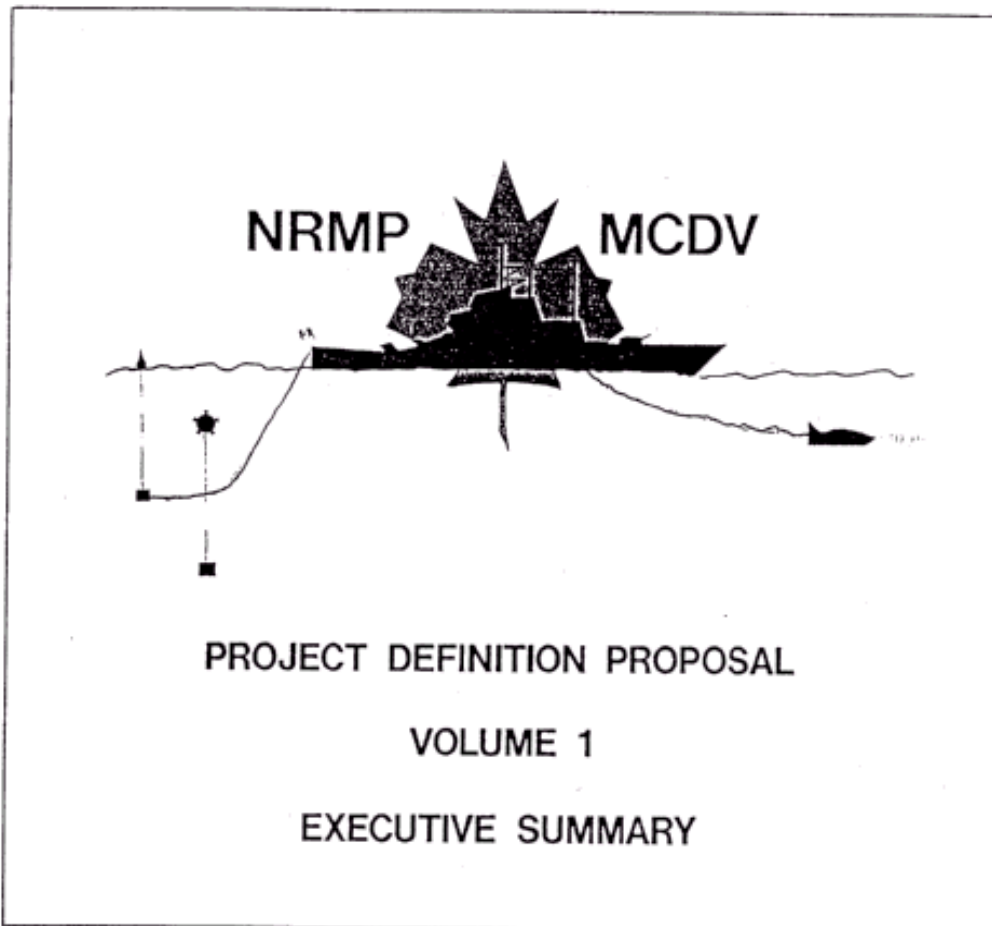
A DESIGN FOR THE
UPGRADING OF FLEET OPERATIONAL
SUPPORT THROUGH NEW CONSTRUCTION
EXECUTIVE SUMMARY



AUGUST 1988

Prepared by MIL Systems Engineering Inc.





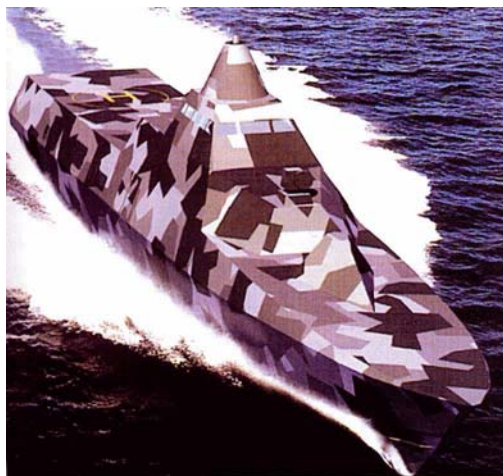
MIL Systems Engineering Inc.



All modern Navies face the threat of high technology weapons, and so need to manage the signature of its ships with respect to electro-magnetic, acoustic, infra-red, etc. All of these areas require sophisticated technological solutions, and have different priorities as to whether the ship/boat is surface or sub-surface. The surface vessel is vulnerable to attack from the air, from other surface ships and from below the surface. The sub-surface boats are more vulnerable to attack from other sub-surface boats but are also subject to attack from surface and airborne units. All units are susceptible to long range detection by radar, and so a number of Proposals were made to the Navy prior to and during the first Gulf War in early 1990. Stealth (or self protection as it is sometimes called) is, like quality, best “designed in” but can be added as a retrofit.

Radar signature reduction is generally best affected by judicious design by reducing radar amplifying structures, viz. any surfaces which are at right angles to each other, and where large flat surfaces exist, by the application of radar absorbent material. One first needs to know the nature of a ship’s radar signature, which requires measurement by a suitable radar, and having reduced the signature to an acceptable level to provide a radar measurement facility to be used periodically to ensure that the ship’s radar signature has not been degraded over time. This subject was dealt with in great detail by MIL Systems Engineering due to the lessons learnt during the Falkland’s War by the Royal Navy and the proliferation of air to surface and surface to surface radar guided missiles. **Infra-red signature** of ships had been well researched and solutions derived by DND’s Research & Engineering Establishment at Suffield on the East Coast, (DRES). The DRES Ball was one solution and the Eductor system was another, and these were fitted to the DDH 280’s during the TRUMP refit and to the new build CPF (Halifax Class) Frigates, respectively. **Acoustic signature** of submarines had been provided for many years by the use of acoustic absorbent tiles glued to the outside of the hull, and some surface ships used this same approach. Modern tiles can both retain internally generated noise and absorb externally generated noise (SONAR signals), and are designated ANTL tiles (Acoustic Noise & Transmission Loss).

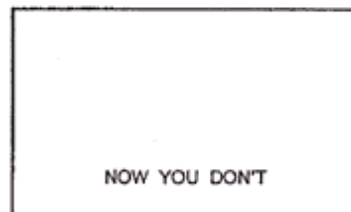
The **Swedish Visby Class** embodies all these attributes, as well as the oldest signature alteration of all, camouflage





NOW YOU SEE IT

SIGNATURE MANAGEMENT



NOW YOU DON'T

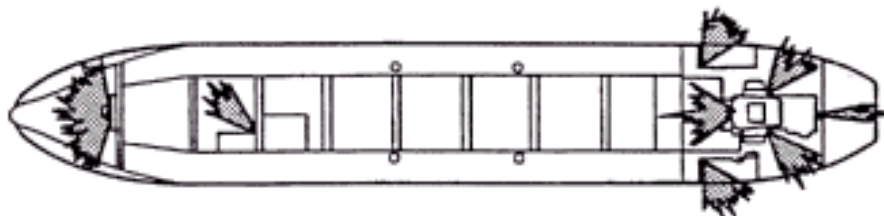
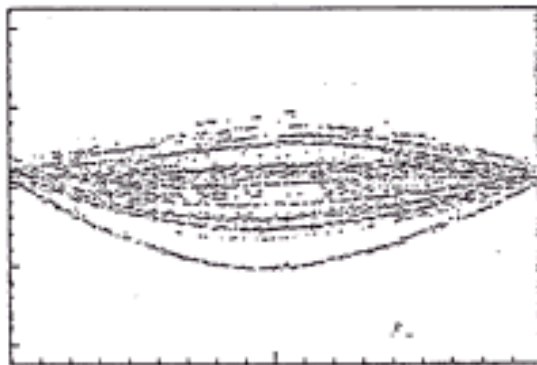
A PROGRAM PROPOSAL BY

MIL  **Systems**



1621

A PROPOSAL FOR
THE
ESTABLISHMENT & OPERATION
OF A
RADAR CROSS SECTION MEASUREMENT
FACILITY



MIL  Systems



MIL  Systems

LETTER PROPOSAL

700 - 1600 Carling Avenue
Ottawa, Ontario
K1Z 8A7

National Defence Headquarters
Ottawa, Ontario
K1A 0K2

29 October, 1990

Ref: JRW 12,801

Attention: O. R. Bezemer, Section Head
Passive Protection Systems DMES-3
Directorate of Maritime Engineering Support
Chief Engineering Maintenance

SUBJECT: RCS MEASUREMENT OF 3 WEST COAST SHIPS

Dear Mr. Bezemer:

On 2 October last MSEI presented a Proposal to DMES 3 (Mr. Wessman et al) to set up and man a permanent RCS Measurement Range at Osborne Head (and one on the west coast if so desired). At that time we were asked if we could put together a quick data package aimed at measuring three ships on the west coast (HMCS Huron, Restigouche and Provider) and managing their radar cross section (RCS) to reduce their vulnerability to radar seekers.

In consequence we offer the following:

1. install a leased shore based imaging radar and operate it at a site to be determined on the west coast, including the resulting RCS data analysis of three ship classes both before and after the application of radar absorbent material (RAM); technical specification is appended at Appendix A.
2. analysis of all three ship classes drawings to determine expected points of radar signal scatter.
3. supply of RAM, specific type to be selected by DND based upon the intended permanence of the installation, i.e. removable bags or permanent sheets and/or spray; technical specifications are appended at Appendix A.

Telephone: (613) 722-2247
Telex: 053-4763
Fax: (613) 722-3505

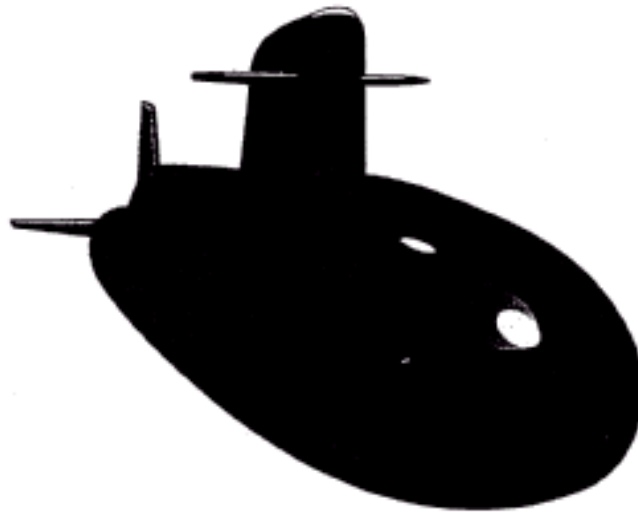
MIL Systems Engineering Inc.
Member of The MIL Group



AIR INDEPENDENT PROPULSION

with

Proton Exchange Membrane Fuel Cells



NO NOISE

NO HEAT

NO EMISSIONS

NO SIGNATURE

MIL  Systems

+



THE S M A R T SHIP

STRATEGIC MULTI-ROLE AID AND REPLENISHMENT TRANSPORT SHIP



MIL  Systems



PROVISION OF ENGINEERING SERVICES
TO
DIRECTOR GENERAL MARITIME
ENGINEERING AND MAINTENANCE



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8. ADVANTAGES OF MIL SYSTEMS' EXPERIENCE vis-à-vis SHIP CLASS DESKS

Section 8

ADVANTAGES OF MIL SYSTEMS' EXPERIENCE vis-a-vis SHIP CLASS DESKS

In the notional concept of a Ship Class desk the overall function and requirements of the ship need to be identified and those areas which only the military can perform defined. The scope of civilian support can then be analyzed and the level of desirability be made in the prevailing political, military, industry & fiscal environment. This Section provides a Ship Class Desk scenario which is believed to address the foregoing, utilizing the credibility and depth of experience of MIL Systems.



SHIP'S CLASS DESK

A Ship Class Desk organization can take many forms, but basically needs to address the elements of;

SHIP MISSION / Operations

LOGISTICS to support that mission

DOCUMENTATION as a data base for logistics

DESIGN AGENT / ENGINEERING to support and enhance the mission / capability

MAINTENANCE / REFIT / REPAIR of the ship to enable its mission

TRAINING of crews to accomplish the mission

The foregoing in essence captures the basic needs, some of which can only be performed by uniformed personnel and some of which can be performed by either uniformed personnel or by civilians; the choice for the latter is mostly defined by either national security or by national economics.

The reduction in uniformed personnel that the current DND budget constraints impose requires that the primary task of those personnel to discharge the "mission/operational" requirements of the Navy is of the highest priority.

Consequently, more rather than less commercial involvement is prudent due to industry's practise of "time sharing" its employees between various programs in order to provide the necessary "cost effectiveness" of its business units, and so can provide economies to the reduced DND budget.



SHIP'S CLASS DESK (continued)

Commercial resource management on a cost basis is a normal function of a commercial business unit to provide resources on an "as and when required" basis.

High overall quality and expeditious support are paramount if the ship mission is to be carried out with maximum efficiency and minimum risk. With respect to quality, MIL Systems is certified to ISO 9001 (previously certified to AQAP 1) which is a total company-wide quality program; with respect to "on time" support, MIL Systems has demonstrated its capabilities since 1949 through the NCDO/MDDO program contracts.

The following table expands on some of the elements referred to on the previous page. It is not totally comprehensive but does provide the next Work Breakdown Structure level and is to a large degree supported by the Navy's intentions stated in the current RFQ for the In Service Support Contract for the Maritime Coastal Defence Vessel (MCDV ISSC) and can be extrapolated to similarly cover all other Naval ship classes.

MIL Systems is uniquely qualified for the ISSC scenario in that it has had in existence for some time facilities close to

- * DND Headquarters * Naval dockyards Atlantic & Pacific*
- * Naval Reserve Headquarters * DGMEM (now DGMEPM)*

These locations are shown on the following "Canada Map ISSC" figure.

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1	2	SHIP CLASS DESK FUNCTIONS	DND MIL(S)
		OPERATIONS	*
		LOGISTICS	
		munitions supply	*
		victualling supply	*
		spares procurement & supply	*
		DOCUMENTATION	
		technical data packages	*
		technical data	*
		technical documents	*
		procurement/provision documentation	*
		publications	*
		drawings	*
		detailed administrative documents	*
		ENGINEERING (DESIGN AGENT)	
		technical investigations	*
		risk assessment & management	*
		maintenance of technical databases	*
		maintenance of technical data packages	*
		Engineering Change Proposals engineering	*
		engineering support to maintenance activities	*
		software support	*
		configuration management	*
		MAINTENANCE / REFIT / REPAIR	
		first level (onboard by crew)	*
		second & third level	*
		plan, engineer & conduct work periods / refits	*
		inspection of work	*
		TRAINING	
		operational	*
		technical	*
		logistics	*



SHIP'S CLASS DESK (continued)

Some clear EFFICIENCY GAINS can result from a

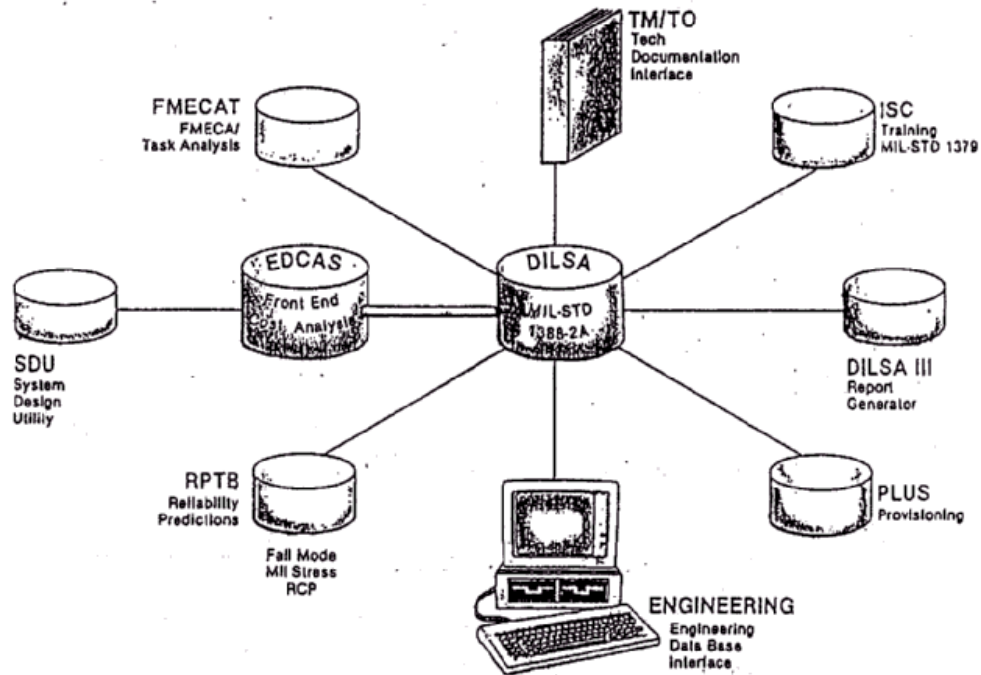
SINGLE CONTRACTOR

handling all Ship Class Desks

- * *common knowledge base*
- * *common operating processes & procedures*
- * *common inventory warehousing*
- * *common "Port Engineer" personnel pool*
- * *minimum DND resource management of the single civilian contractor*
- * *efficient basis for rotation of Naval personnel between Class Desks without retraining*
- * *"one stop" consultation point for changing naval scenarios for potential technology / other efficiency improvements*

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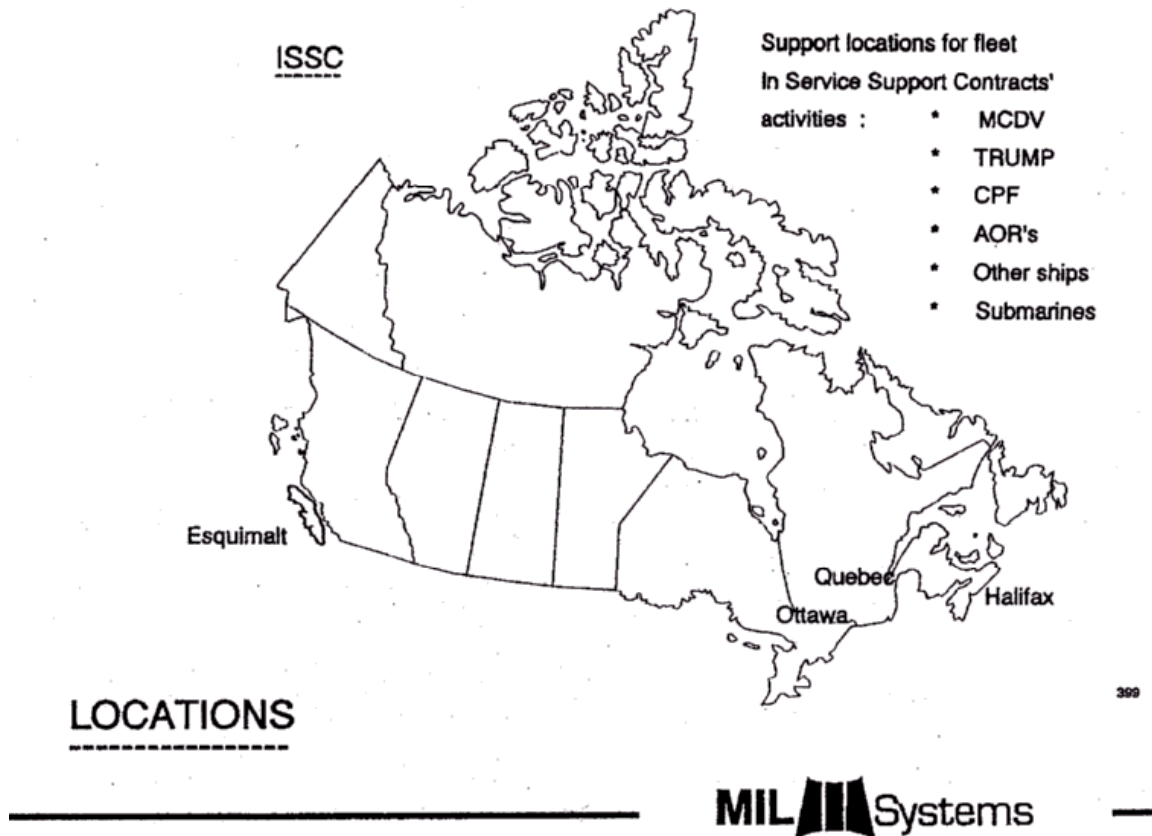
DOCUMENTATION

MIL  Systems

Documentation is a vitally important control tool for maintaining the ships in a class to be the same, so that as crew is circulated due to career moves and other considerations, learning a new ship when it is one of a class of ships is unnecessary. DILSA is an available concept in which all documentation is integrated, no matter where it was raised or for what purpose. The system can be interfaced at as many remote locations as found desirable through common Engineering Data Base Interface computer stations. Data can be input and resulting Reports output as required. The EDCAS module provides for a Front End Cost Analysis.



9. CONCLUSION



In conclusion, *MIL Systems* is suitably qualified to assist the Navy in the evolution of its Operation Excelerate concept.

- The Company is well located geographically to serve the Navy's needs, with its Head Office located in Ottawa close to DND HQ to best facilitate close personal liaison with DND's staff, and, it has clearly unparalleled capability and experience in Canada.
- The Company is certified to ISO 9000 by Lloyds for ship design.
- There is clearly an economic advantage to having one organization supporting ALL the Ship Class Desks in that only one contractual and performance interface is required by DND, and that truly common methodology would exist for the logistics support of all ship classes which would also facilitate the movement of uniformed personnel moving from one Ship Class Desk to another.



Section 9

CONCLUSION

MIL Systems has demonstrated for 46 years since its inception in 1949, its abilities and its loyalty to the Canadian Navy. It has consistently worked harmoniously with the changing DND Naval personnel and the Navy's procurement agency (now PW&GSC).

Initially, it provided its services from Vickers Shipyard facilities in Montreal, then as its taskings increased in engineering depth it moved to Ottawa to be closer to DND HQ, and also set up facilities outside the Navy Dockyards on each coast, as well as an LCMM support facility in Ottawa.

MIL  **Systems**



Section 9 (continued)

MIL Systems has demonstrated the core capability to do all work not required to be performed by DND uniformed personnel. It has managed major work (TRUMP & CPF Designs) as well as the NCDO/MDDO ship support work together with numerous specialist engineering TIES including equipment design, procurement and qualification. It is also versed in commercial ship design practise.

MIL Systems has demonstrated strong, effective management and has provided insightful R&D and developmental studies to the Navy, and stands :

READY, AYE READY