3.3

NCDO to MDDO history - A perspective

from notes by Tom Campbell & Dave McKenzie
two of the original NCDO people (3)

In ***1948*** the St. Laurent class programme (7 escort vessels) was announced, requiring a departure from previous naval ship procurement in that it required a new ship design that embraced specific Canadian Navy requirements. Previously, ships were built offshore then modified for the Canadian Navy environment. No Canadian shipyard possessed the experience of preparing a design of the type required, and neither was the Canadian Navy staffed as a warship design authority. No single Canadian shipyard had a drawing office capable of either developing the type of systems required or integrating them into the St. Laurent design. Setting up a Naval Central Drawing Office under the direction of a consulting ship design firm was considered, but Harold Blakely, President of **Canadian Vickers** of Montreal, Quebec offered to set up a private facility (distinct from its non-Naval ship design work) within its company facilities if Canadian Vickers was designated Lead Yard for the ship build program.

So, in ***1949*****,** Canadian Vickers, Montreal set up and managed a dedicated design office for this Naval function and staffed it with some of its own personnel augmented by experienced personnel on loan from normally competitive shipyards on both the east and west coast; later, heavy recruitment by Canadian Vickers from shipyards in the UK allowed the east and west coast personnel to return to their homes. ***The Federal Government subsequently directed work to this new design office*** under the contractual title of NCDO (Naval Central Drawing Office) on a level-of-effort basis. Guidance for the NCDO contract activities was provided by an RCN overseeing team (the PNO – Principal Naval Office) the first Manager of which was Cdr. Frank Freeborn, RCN.

The first Canadian Vickers Manager of this dedicated design office was Charles Brassington.. The first ship design project was to produce the Detail Design for the St. Laurent DE Class of ships. At the same time, a Naval Ships Central Procurement Agency (NSCPA) was set up as an offshoot of the NCDO to consolidate where possible the identification of Canadian sourcing of equipment and material for use in Canadian built naval ships. Canadian Vickers was initially a design and build shipyard for commercial ships. In 1966 it ceased to build new ships and reverted to the business of repair and maintenance of ships.

The original NCDO drawing office set up in Canadian Vickers, Montreal

In ***1972*** the Federal Government decided to put its ship design requirements out to ***Competitive Tender*** (as opposed to Directed Contracts), and as a consequence the contracting name NCDO was renamed **NSDA** (Naval Ship Design Agency). The PNO Manager function was discontinued. ***Canadian Vickers won that 1972 contract.***

In ***1974***, the overseeing function in the Canadian Vickers facility by the RCN of the now NSDA work gave way to a more formal private business arrangement and Canadian Vickers formed a joint venture company with Stanwyck of the USA, **Vickers Stanwyck,** to pursue and discharge the NSDA contract work plus expansion of the company into other areas of warship design and maintenance. The original expert personnel of Vickers were retained. The NSDA contracts were changed from the previous NCDO "level-of-effort" basis to a "cost-plus-fee" basis. The historical award of 3-year terms was retained, but from time to time extensions for a further 1 or 2 years were awarded to maintain continuity in design work then under contract. Also, in 1974 the contract name for the work was changed to **MDDO** (Marine Design & Draughting Office).

Vickers Stanwyck successfully bid competitively against other Canadian companies for the MDDO work in 1975. During that period, the contracts called for two Managers (similar to the previous Overseer function) one from DND (the Department of National Defence, the contracting Authority) and one from the Contractor.

The first DND Manager was Alan Kastner, a retired Naval Officer, and the first Contractor Manager was Tom Campbell. In 1978 the DND Manager was changed to Gordon Smith, another retired Naval Officer, but after one year the DND contract requirement that there be no Employer/Employee relationship caused DND to withdraw its Manager.

Halifax Class, AOR Class & Iroquois (TRUMP) Class
Major design achievements of the NCDO/MDDO design team

In ***1976***, Stanwyck's maintenance capability was found to be incompatible with Vickers' ship design/upgrade capability expansion, so Stanwyck sold its interest to the Versatile shipyard of Vancouver, BC and the new corporate entity of **Versatile Vickers** was established. ***It competed for and won the next MDDO contract in 1978.***

In early ***1980,*** due to the problem of recruiting qualified people in Montreal, the President of Canadian Vickers (Harold Blakely) directed Tom Campbell to move the dedicated naval design office activity (which included the majority of the original design office work force) from the Canadian Vickers facility in Montreal to Ottawa; this placed the office personnel closer to Naval Headquarters. The President of this new corporate enterprise in October 1979 was Greg Short, an equal partner of the group of seven who had recently purchased Canadian Vickers, and the new Company was opened in Ottawa with support offices in Montreal, and eventually in Halifax and Victoria. The company decided that it was time to expand its capability to enhance its position as a main contender for the **CPF** and **TRUMP** programs.

Lorne Minogue Associates was purchased by the Company to expand the capability into the area of marine technicians, and Norris Warming Canada Ltd. was purchased to provide a total HVAC (Heating, Ventilation, Air Conditioning) capability from design to implementation to support. ***In 1981 the MDDO contract came up for re-bid, and was won by Versatile Vickers, and again in 1984 (this contract was extended to 1989 to complete the DELEX program).***

In the late 1980's and the early 1990's, the Federal Government was urging Industry to rationalize the Canadian shipbuilding industry. Versatile owned a number of shipyards in both British Columbia and in Quebec.

The Quebec Government, through its Provincial company le Societe Generale de Financement which reported through the Minister of Industry to the Quebec Cabinet, encouraged the Quebec shipyards to rationalize themselves and formed le Groupe MIL which then bought the Quebec-based industry elements from Versatile in ***1987***. This included the three major shipyards in Quebec, Canadian Vickers (Montreal), Davie Shipyard (Lauzon, opposite Quebec City) and Marine Industrie Limitee (Sorel). In the process le Groupe MIL inherited the design office of Versatile Vickers, Versatile Systems Engineering Inc. (VSEI). Over time, le Groupe MIL closed all the shipyards except MIL Davie, and renamed the Versatile Vickers design office from Versatile Systems Engineering Inc. to **MIL Systems Engineering Inc.** (MSEI). ***MSEI won both the 1989 and 1994 MDDO contracts competitively, both of which were 5-year contracts.***

The Company having been awarded both the CPF and TRUMP design contracts, a strong relationship sprang up with YARD Ltd. of Glasgow, Scotland and a Joint Venture Company named YARD Inc. was formed in Ottawa between MIL Systems Engineering and YARD Ltd. This further expanded the Company's capabilities into specialized areas of ship design such as acoustics, and ship systems.

In December 1979 Greg Short resigned as President and was replaced in January 1980 by Alex Arnett, a retired Naval Officer. Alex Arnett served as President until his death in January 1985. Ted Jones succeeded him as interim President until Bill Christie became President in February 1985, but his tenure was short-lived and in July 1985 Vice Adm. (ret.) Jock Allen became President until September 1987. In December 1987 Jim Williams, a local Ottawa businessman, became President & CEO and presided over both the CPF and TRUMP programmes; Jim Williams retired in December 1996. John Keast then became President until the company closed in 2002.

The core of expert personnel from the original dedicated design office formed in 1949 now had a 4th new corporate name and continued to win competitively the ongoing MDDO contracts. This iteration of the original core of NCDO personnel continuing their work in these variously named private companies was an important aspect of Canada's capability to provide the Canadian Navy with new ship design services as well as the modernization and ongoing upgrading and engineering maintenance of existing ships.

A typical Booth presentation used by the MIL Group at various trade shows. In this case two model ships are used, on the left a model of the SMART ship and on the right the TRUMP version of the DDH 280 class.

Manning the booth are (from the left) Bob MacLaren, the Snr. Naval Architect of MIL Systems Engineering; a Sales representative of MIL Davie; Jim Williams the President & CEO of MIL Systems Engineering; and Steve Daniels, a Snr. Marine Engineer of MIL Systems Engineering.

In ***2002***, MIL Systems Engineering closed for lack of work since for the first time ever the maintenance of a new ship (the CPF) had gone to the builder (SJSL) and not the designer. (MSEI). Fleetway of Ottawa, a subsidiary of Saint John Shipbuilding Limited of New Brunswick, continued that work under the MDDO contract. Although Fleetway has "MDDO" contract work for warship maintenance engineering to perform, none of the original Canadian Vickers "NCDO" people are now involved since we had by now all reached retirement age, so an end to this era had arrived.

The NCDO/MDDO period established an indigenous warship design capability to cater to the Navy's specific warship operational requirements.

This new capability, of itself, spawned a growing personnel pool of warship design expertise which can be drawn on by various Industry organizations as may be required in the future, provided the needs of the Navy is sufficient time-wise, otherwise the expert personnel will have to find other types of work outside the warship design area and the capability will be lost.

Tom Campbell is on the extreme right, front row.
To his left are first Jan Newman, then Managing Director of YARD Ltd. Glasgow, then Jock Allan (VAdm. RCN Ret'd) then President of Versatile Systems Engineering Inc.
In the back row, between Jock Allen and Jan Newman is Larry Sellick, author of the paper titled Canadian Procurement History given elsewhere in this document.

40th anniversary of NCDO/NSDA/MDDO contracting

– a coffee mug issued by MIL Systems Engineering Inc.

3.4

NCDO to MDDO Period

from Notes by Alec Patterson - past MDDO Program Manager, MSEI (4)

Alex Patterson seemed to naturally assume the role of historian for the company MIL Systems Engineering Inc. during the mid 1980's to mid 1990's during which time he was tasked by the company to assimilate various data so that the company could establish its credentials in the emerging Canadian scene for wider support to the Navy by Industry.

He collected his data in a binder in which he later placed in its cover pocket the previous montage; which shows the Canadian Patrol Frigate (Halifax Class frigate), a Coast Guard Life Boat and its High Speed Sounding Vessel, and the RO/RO Ferry “Isle de la Madeleine”. The ISO 9001 certification badge by Lloyds is also proudly displayed.

The reverse of that montage proclaimed:

Alex’s Binder contains a wealth of data in both text and photo format, spanning the early years of Canadian Vickers as well as great details of the Versatile Vickers period and the new NCDO contract until, in fact, the dissolution of MIL Systems Engineering as an operating company, just prior to which he retired.

The following data are taken from Alex’s notes, and include both typescripts and manuscripts in historical time order.

The first is a major dissertation he produced for the early phases of the Versatile Vickers period, starting with a draft paper on the history of the design team. The following paper was used for Public Relations with prospective customers, and shows the major capability of the Versatile

Group. It would appear, in retrospect, that the Versatile Group was exactly what the Navy would have wanted in an Industry partner, but the business failure of a major part of the Versatile Group (the farm equipment Division) and the subsequent sale of its east coast operations to the MIL Group, plus the desire of the Federal Government to have the shipbuilding Industry rationalize itself, resulted in a gradual dilution of the Industry capability until in the 21st century no experienced warship design team and only a few capable shipyards existed.

The most modern shipyard was the Saint John Shipyard. It had built nine of the twelve Halifax Class frigates and had later bought the Halifax Shipyard in which the twelve MCDV vessels were built. It had also procured Fleet Technology in Ottawa, which had shared the latest MDDO contract with MIL Systems Engineering, and with the sell off of the MIL Group resulting in the demise of MIL Systems Engineering, Saint John was clearly the only player in Canada. Saint John Shipbuilding is owned by the Irving family, which has very deep pockets with which to sustain their capability during those times when the Navy had little business to conduct because of the strict budget policy of the Chretien Liberal Government throughout the 1990's and into the early 2000's. At the time of writing the Saint John Shipyard was shut down, having no work to sustain its workforce.

AFP.

D R A F T 12 December 1984

BACKGROUND

Prior to the introduction of the Naval Central Drawing Office (N.C.D.O.)* some thirty-five years ago, there had never been the requirement, nor the opportunity to produce an all-Canadian designed and built class of Warship. However, with the aftermath of the Second World War and the entering into the age of emerging self-reliance, naval planning had to face the problems of warship production in Canada without the technical know-how developed and accumulated by other Nations.

As a result of this deficit, the N.C.D.O. was formed in 1949 for the primary purpose of the production of construction and installation drawings for the Royal Canadian Navy beginning with the St-Laurent Class of ships. The office was set up and operated by Canadian Vickers Limited under contractual arrangements with the Department of Supply and Services.

Contract Design and/or Working Drawings for virtually every major new construction and/or conversion programme have been processed through the N.C.D.O. with final distribution of same to the shipyards. These programmes include:

NEW CONSTRUCTION		CONVERSIONS	
'St-Laurent'	Class D.D.E.'s	'St-Laurent'	Class D.D.H.'s
'Restigouche'	Class D.D.E.'s	'Restigouche'	Class D.D.H.'s
'Mackenzie'	Class D.D.E.'s	'Ocean Escorts'	Class D.E.'s
'Annapolis'	Class D.D.H.'s	'Bangor'	Class D.E.'s
'Iroquois'	Class D.D.H.'s	'Bonaventure'	Aircraft Carrier
'General Purpose'	Frigates	'Cormorant'	
'Vancouver'		'Protecteur'	
'Provider'	Op. Supply Ship	'Provider'	
'Y.M.T.'	Diving Tender	'DELEX programmes	

As a component or extension of the Department of Defence, the N.C.D.O. involved itself in numerous other activities, some of the more basic functions being: preparation of Specification and Ship Standards

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*N.C.D.O. has gone through numerous name changes: CFTSD, NSDA, MSS and now MDDO.

Drawings, Market Research, Assessment of Quotations, C.P.M. Networks and Control Systems, Weight Control, Corrosion Control, Quality Control and Assurance of Drawings, Production of Master Composite Systems Drawings and Small Scale Models, etc., etc.

In 1958, a companion organization to the Naval Central Drawing Office was formed for the centralized procurement and distribution of all non-Government Supplied Material, and was called the Naval Shipbuilding Central Procurement Agency (N.S.C.P.A.). This new organization processed an estimated 75,000 'line items' per Class of Ship, from Requisitions and/or Purchase Specifications raised by the N.C.D.O. In addition, the N.C.D.O. were responsible for processing 'Leadyard Demands' on behalf of the Shipyards for all Government Supplied Material and/or Equipment.

Whilst, the N.S.C.P.A. was disbanded prior to the commencement of the DDH-280 Class Programme, because of the concept of Shipyards being responsible for their own procurement, the expertise and experience of personnel within the organization was retained and assimilated into the N.C.D.O.

The MDDO was a lucrative contract and it became obvious that other marine consultants and organization were interested in acquiring such a contract. 1972 saw the first competition for the MDDO contract, which Vickers won and under various names have continued to win in competition on a three-yearly basis until 1984 when a directed contract was let to VVSI.

In 1975 with the advent of the CPF Programme, it was decided to exploit the capabilities that were inherent in the MDDO. The MDDO contract called for limited services, to maintain existing drawings and to provide other engineering and drawing office services. Tom Campbell saw that the office capabilities were far in excess of such a role and formulated the idea which eventually became VVSI, a group which could perform conceptual design through to construction design.

The idea of providing high technological services through the MDDO contract has been gradually accepted by DND and changes have evolved in the types of billing that may be used to cover such new items as computer costs, sub-contracted specialist services.

The MDDO has formed the nucleus of VVSI around which the total design capability has developed. The evolutionary growth of the MDDO provides significant experience from which may be derived a strategic approach to the formation of another such group.

A.F. Patterson

1 INTRODUCTION

1.1 PURPOSE

The purpose of this paper is to describe the background, experience, development and future of three principal elements of the Versatile Marine & Industrial Group. Those elements are - Versatile Vickers Systems Incorporated, Versatile Vickers Incorporated and Burrard Yarrows Corporation.

The description which follows will highlight the management, engineering and shipbuilding production skills of these companies. When integrated under one corporate roof, these companies will represent the leading marine design, construction and management enterprise in Canada.

The Versatile Corporation involvement in the Canadian Patrol Frigate Program in the areas of design, detailed design and three ship construction will bring more than five hundred million dollars to the Marine and Industrial Operations Group over the next four years.

2 BACKGROUND

2.1 CORPORATE

Versatile Corporation is a Canadian industrial enterprise engaged in marine design, construction, repair and maintenance; heavy industrial manufacturing; oil and gas development; agricultural equipment manufacturing; cold storage warehousing and financial services.

In 1981 Versatile Corporation acquired Versatile Vickers Inc, in Montreal and Versatile Vickers Systems Inc with offices in Montreal, Ottawa, Halifax and Victoria. In addition to Burrard Yarrows Corporation in Vancouver and Victoria, this acquisition established a national base for the Marine and Industrial Operations Group. A more detailed description of these companies follows

Versatile Corporation farm equipment is internationally recognized and as well as its Canadian and United States manufacturing centres, the Corporation specializes in the manufacture of sugarcane harvesting equipment in its Australian subsidiary of Versatile Toft Ltd. Distribution of other farm equipment is undertaken by the Versatile Farm Equipment Pty. Ltd. in New South Wales.

Oil and Gas Operations enjoys corporate participation in Australia with exploration and development of offshore and onshore marketing. The principal areas of activity of the Group are centred in Canada and the United States.

Versatile Corporation also operates a financial services group with offices in Canada and the United States. In British Columbia and Alberta the Versatile Cold Storage plants have a total capacity of 12 million cubic feet.

2 BACKGROUND (CONTINUED)

2.2 MARINE & INDUSTRIAL OPERATIONS GROUP.

(a) Versatile Vickers Systems Inc.

Versatile Vickers Systems Inc. (VVSI) was established in 1979 as the Marine Design Consultant subsidiary of Versatile Corporation, and is a member of its Marine and Industrial Operations Group. Formed to create within Canada a combination of design engineering, maintenance and management resources based upon the experience of the companies in this Group, VVSI coordinates the diverse areas of expertise inherent within its technical personnel.

Head office is in Montreal, Quebec, with branch offices and technical staff situated in Ottawa (Ontario), Halifax (Nova Scotia) and Victoria (British Columbia).

Its Engineering Divisions specialize in ship systems design. Their capabilities extend from the conceptual design of warships and merchant ships to the detailed design and engineering support of such diverse vessels as trawlers, tugs, oil-rigs, oceanographic research vessels and patrol boats. The whole spectrum of marine design activity, from concept to construction and operational support, can be addressed by members of the Engineering Divisions' staff.

The Logistics Division of VVSI offers maintenance management and its complementary spares and inventory control systems amongst its principal products. These systems, available in manual and computer modes, are in use in the maritime, industrial and commercial fields.

VVSI also provides technical assistance to its clients in the form of drawing office facilities and field support drafting, design and engineering staff, as well as technical publications and other support documentation.

Its current engineering staff numbers more than 200 engineers, draftsmen, and technologists, and it is intended by mid 1984 to increase the Montreal staff by another sixty technical personnel.

2 BACKGROUND (CONTINUED)

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2.2 MARINE & INDUSTRIAL OPERATIONS GROUP (CONTINUED)

(b) Versatile Vickers Inc.

In 1910 the Canadian Government and Vickers Ltd., of England entered into an agreement to construct a shipbuilding facility with floating docks at Montreal, Quebec.

With the advent of the First World War, these facilities were placed at the disposal of the defence effort and entered a phase of maximum plant production. Among many vessels turned out during that war were twenty four submarines, six of which were the first underwater boats to cross the Atlantic under their own power. Canadian Vickers involvement with naval vessels has continued uninterrupted since that time. The Industrial Division among other heavy engineering contracts has recently completed structural sections/assemblies for U.S. Navy nuclear submarines.

In 1949, again with Government encouragement, Canadian Vickers established a naval design capability at its Montreal plant to enable all RCN designs and plans for new destroyer escorts to be developed and detailed, from which construction drawings could flow to the follow yards. This design capability, then known as the Naval Central Drawing Office formed the nucleus of the now-named Versatile Vickers Systems Inc., the marine consultancy arm of the Versatile Corporation.

The Ship Repair Division has been highly successful in the acquisition of multi-ship refit contracts for vessels of the Canadian Navy and is currently (Dec. '83) modernizing the HMCS Athabaskan and HMCS Protecteur.

2.2.(b) (CONTINUED)

The Industrial Division is extremely diversified in that it manufactures highly sophisticated items for both defence and industry. The Division is highly committed in the production of nuclear energy components. The principal products are CANDU Colandria vessels and their ancilliary equipment. It has recently completed orders for subway rolling stock and structural assemblies for U.S. Naval vessels including submarines and aircraft carriers.

(c) BURRARD YARROWS CORPORATION

Burrard Yarrows Corporation was formed in 1979 by the amalgamation of Burrard Dry Dock Company Limited and Yarrows Limited, two shipyards which had operated under common ownership since 1946 and prior to that as separate firms since the 1890's. Both yards now operate as divisions of BYC, a wholly owned subsidiary of Versatile Corporation.

BYC has a proud tradition in shipbuilding and ship repair, both in wartime and peace, and has over the years become the largest shipyard operation on Canada's west coast and Canada's largest ship repairer. It also has a wide ranging capability in new ship construction having built commercial and naval vessels including extensive experience in ice-strengthened Arctic vessels.

3 FACILITIES

3.1 The Marine and Industrial Operations Group comprises the three companies, the facilities of which are described below:-

(a) Versatile Vickers Systems Inc. (VVSI)

The organization is housed in four locations, Montreal, Ottawa, Halifax and Victoria and occupies over 60,000 square feet in its offices to accommodate more than 200 full time permanent staff.

The offices are located close to city centres, road, rail and air transportation and close to Government and Industry Head Offices.

Each of the offices has security cleared documentation storage facilities to the 'SECRET' level. All have Telex, facsimile transmitters, computers, photocopying and printing capabilities.

In the Ottawa office, there is a publications department with a word-processing bureau and supporting graphic-arts staff. This office also accommodates the main frame computer for VVSI with remote-job-entry terminals linked by modem to the Montreal and Halifax offices. This computer is capable of handling VVSI engineering, management and CAD/CAM System.

To augment the in-house computer facilities, VVSI has access to those programs available from Y-ARD in Glasgow Scotland, with which VVSI has close technical and contractual ties. (Y-ARD & Stanwick Corporation joined Vickers in forming Vickers Stanwick Systems which was subsequently to become Versatile Vickers Systems Inc.).

(b) Versatile Vickers Inc (VVI) and

(c) Burrard Yarrows Corporation (BYC)

Details of the production facilities and plant layouts are shown on the following pages which are extracts from the Canadian Shipbuilding and Ship Repairing Association publication 'Canadian Shipbuilding and Allied Industries' April 1983 edition.

4 CAPABILITIES

The capabilities of the Marine and Industrial Operations Group are indicated in the matrix and are amplified in the definitions below:

4.1 Matrix of Capabilities

CAPABILITY	VVSI	VVI	EVC
DESIGN	*		*
CONSTRUCTION		*	*
COMMISSIONING	*	*	*
INSPECTION	*	*	*
MAINTENANCE		*	*
REPAIR		*	*
MANAGEMENT	*	*	*
LOGISTICS	*		
DOCUMENTATION	*		
TRAINING	*		

4.2 Definition of Capabilities

(a) Design -

Conceptual, Preliminary and Detail Design Services for Naval Architecture, Structures, Propulsion Systems, Electric Plant, Electronics Auxiliary Systems, Weapons Systems and Outfitting. The Engineering Divisions have Technical Support Groups offering Procurement, Transportation Studies, Ship Surveys, Estimating and Training Services. Drawing office services are also provided for Non-marine Activities.

(b) Construction

Construction of vessels up to 153m in length up to 28m wide, with outfitting lifting capability of up to 150 tonnes mobile and 275 tonnes floating crane.

Steel throughput of 20,000 tonnes (EVC) and 15,000 tonnes (VVI); manhour availability, three shifts is approximately 8.9 million per annum.

4 CAPABILITIES (Continued)

(c) Commissioning

Set-to-work, start-up and commissioning teams are available from all three companies. These teams are formed from technical staff many of whom are ex-naval officers, technologists and technicians from the principal disciplines - Hull, Marine Engineering, Electrical Engineering and Combat Systems. These personnel in many instances have been responsible in their military careers for the commissioning and re-commissioning of all classes of vessels.

(d) Inspection

Inspection services are offered by VVSI and augmented by VVI and BYC staff. These services are related to ship surveys on behalf of various Government agencies such as Coast Guard, Defence, Fisheries and Oceans, Ministry of Transport. Several of the staff have qualified with the Department of Supply and Services for inspection duties related to their respective areas of expertise.

(e) Maintenance

(i) VVSI in its Integrated Logistics Systems Divisions undertakes ship surveys of equipment, existing maintenance routines and manufacturers data and from these creates a maintenance management system which can be offered in a manual or computerised system. These systems are capable of being operated by the equipment users or being operated from the VVSI local offices and communicated to the client.

(ii) Shipboard maintenance can be undertaken by the shipyard personnel on an as-and-when required basis when ships are dry-docked for repair and overhaul.

4 CAPABILITIES (Continued)

(f) Repair

Both Versatile Vickers Inc. in Montreal and Burrard Yarrows Corporation in Vancouver and Victoria have comprehensive ship repair capabilities. VVI is engaged in repairs to both naval and commercial vessels, using three dry docks capable of handling the largest ship traversing the St. Lawrence Seaway and Great Lakes. VVI operates its dry docks within its outfitting basin which is 1600 ft long by 500 ft wide with a draft of 48 ft. A floating crane provides a 275 ton lifting capability. VVI can repair up to six vessels simultaneously.

Burrard Yarrows Corporation has extensive ship repair experience particularly in naval refit work. It has the capability of dry-docking and servicing vessels up to 230m long and 45m wide in the Vancouver dock; 360m by 38.4m in the Esquimalt dock in Victoria.

(g) Management

The management capabilities of each of the organizations have been founded on years of experience in the ship design, building and repair industry. The experience gained on major design projects, new construction programs and large multi-ship, multi-million dollar contracts, has been supported and amplified by exposure to the latest in management techniques. All three components of Versatile's Marine and Industrial Operations Group utilize Management Information Control Systems (MICS) for items such as Project Management, Payroll, Data and Documentation Control, Deviation and Design Change Management, Configuration Management, Weight Control and Monitoring. Management of Design has recently been accomplished by VVSI in its role as design

4 (g) continued

agent for the recently awarded Canadian Patrol Frigate Program. The Program required that management be related to a Contract Work Breakdown Structure (CWBS) and a Cost/Scheduling Control System (CS^2). The management techniques already in operation were capable of integration with these specified systems.

Both VVI and BYC have extensive and successful management records with respect to large naval contracts encompassing multi-ship refits, major conversion programs, mid-life modernization and in the commercial field, numerous new construction activities for such diverse vessels as ice-breakers and offshore-supply vessels.

(h) Logistics

VVSI Logistics Division provides logistics engineering for spares, manning and audits for reliability, availability and maintainability analysis. From these audits, recommendations may be made for equipment selection, replacement or component replacement. Inventory control systems are generated by the Logistics Division with warehousing, minimum quantity and re-order alarm functions as integral parts of the system.

4 CAPABILITIES (Continued)

(i) Documentation

VVSI has a Publications section which is responsible for documentation. Documentation includes the preparation of specifications, technical manuals, operations manuals the graphic-arts to support these publications. On a contract basis VVSI will create Canadian Forces Technical Orders (C.F.T.O.'s) to established formats and through associates will translate and type set, print and deliver such documents.

Documentation also includes the collation of Technical Data Packages which emanate from the technical divisions. These TDP's go forward to shipbuilders, repairers, naval dockyards as the instructions to carry out work.

The word-processing bureau is also operated by the Publications section and is available for proposal work, standards and policy manuals and for planning reports.

(j) Training

Training programs have been and are capable of being developed by the ex-naval and ex-government personnel who form an integral part of VVSI's expertise and background. Programs for training equipment operators, to programs for ship safety training, N.B.C.D., ship orientation, ship handling have been developed and small craft handling training has been given to the Canadian Coast Guard. Members of the training staff have been career managers within the RCN.

5 EXPERIENCE & CLIENTS

5.1 The experience and expertise of the Group, can be categorized into four major sectors, VIZ., Design, Construction, Services and Management. The most significant client of the Corporation's Marine Group has been the Department of National Defence. In the recent award for the Canadian Patrol Frigate Program, Versatile Corporations Marine Group garnered approximately five hundred million dollars worth of ship design and construction work.

(a) Design Experience

In the naval field VVSI has been responsible for the detailed design of all active Canadian warships. It is presently designing a near-shore fisheries patrol vessel, a naval reserve training vessel, a torpedo/ship ranging vessel, a coastal class training vessel and has successfully completed the design competition for the Canadian Patrol Frigate. Other design studies have been performed for ship modernization, ice-strengthening, ship jumbo-izing and feasibility studies for the major naval modernization program for the Tribal Class. (TRUMP is the acronym for TRibal class Update Modernization Project).

5.1 (a) (continued)

The Halifax office of VVSI has been exclusively responsible for the design drawings for the update of the "O" Class submarines and the staff is now responsible for the maintenance of the related documentation and drawings. Burrard Yarrow Corporation has been responsible for the detailed design work for a variety of vessels including destroyer escorts, ice-breakers, passenger and automobile ferries, tugs, tankers, seismographic research vessels, offshore supply, large multi-purpose barges and special purpose barges.

(b) Construction Experience

The experience in construction gained by VVI and BYC is both comprehensive and varied, from tugs to tankers, ferries to fishing boats, coasters to cargo ships, fast patrol craft to frigates. The list of types is exhaustive and the range of sizes from small tuna fishing boats to the largest lakers. There are few types of ships which have not been built by one of the three yards and their respective experience in heavy industrial engineering construction has enabled them to keep abreast of evolving construction techniques. Contracts for marine subassembly construction have been awarded to VVI for the manufacture of U.S. Navy nuclear submarine structural sections, aircraft carrier flight deck elevators, stern doors and sonar domes.

(c) Services

The services offered are varied and relate to the total cradle-to-grave concept of the Marine and Industrial Operations Group. That is

(e) (continued)

from conceptual design through construction to ship operation, maintenance and repair. VVSI offers the following services as part of its Field Services Section:

Inspection, set-to-work teams, Quality Assurance teams, ship and machinery survey, maintenance audit teams, commissioning engineers. The experience of the personnel allocated to these services has been acquired over several years in the marine industry, either as shipbuilding technical staff, members of military service or marine related Government departments.

VVSI also offers drawing office services to clients either by work packages conducted at its own premises or as a team on loan to the client at his premises. For the past thirty years, VVSI and its predecessors have operated a naval drawing office as complementary activity to the Department of Maritime Engineering and Maintenance (DMEM). VVSI has also undertaken design update work for the Canadian Coast Guard Fleet Technical Systems.

(d) Management

The three companies forming the Group have managed their own activities successfully for more than 90 years and in a time when the marine industry has seen a decline, these three companies are in the process of expanding. This is attributable to good management and management techniques. Project management experience is evident in the number of repeat contract awards for multi-ship refits given to both VVI and BYC. Not only in the execution of the contracts but the management skills required to prepare the proposals necessary to successfully compete for the work.

(d) (continued)

In the design field, VVSI has been managing the single largest Defence consultancy contract and in the face of increasingly stiff competition has been able to renew that contract on a triennial basis continually since 1949. It is axiomatic to state that good management is the reason.

(e) Clients

The following list of clients is not comprehensive but contains those from which major contracts have been acquired:

- Department of National Defence
- Canadian Coast Guard
- Department of Fisheries and Oceans
- Shell Transport
- Dome Petroleum
- Canada Steamship Lines
- Gulf Canada
- Halifax Shipyards
- Husky Oil
- Halco (Hall Corporation)
- Marystown Shipyards
- Saint John Shipbuilding & Dry Dock

6 PROJECTED PLANS

The consultancy work which has been undertaken at VVSI since its inception in 1979 has influenced the organization in its choice of technological approach to projects. It was evident that as more sophisticated design work was being obtained, the costs for computer use at service bureaux was becoming prohibitive. As a consequence, in 1980 VVSI installed its own computer system principally to support its expanding design engineering functions. This system was the CYBER 18-20 and through the CYBERNET program, VVSI used proprietary and non-proprietary software such as CASDOP, SFOLDS, STARDYNE, DREA. In 1982, VVSI upgraded its equipment to the IBM 3400. In 1983 due to a perceived increase in capacity and a requirement to use the in-house computer for all systems, both engineering and administrative, VVSI further upgraded its equipment to the IBM 3600.

This equipment will provide for the capability of remote-job-entry terminals from within the central office and from the branch offices of VVSI, links with VVI and BYC in the Marine Group and interface with other terminals in the Corporate Network. This interface will enhance the currently installed CAD/CAM equipment in the manufacturing facilities in VVI and BYC by creating a design link from drawing office to construction site.

BYC is currently equipped with AUTOKON for steel definition. AUTOKON is a comprehensive computer-based system for detailing and production preparation of steel structures in the shipbuilding industry. VVI uses NC 9 and ENCODE System 3 for computerized design, graphics, materials listing, production control and scheduling.

The Corporate CAD/CAM Review Board is presently undertaking a comprehensive review of corporate requirements to arrive at a mutually

6. (continued)

beneficial and compatible suite of computer terminals, interactive graphics modules, in-house developed software to complement its development of the corporate wide CAD/CAM System.

The first use of CAD/CAM for marine design at VVSI will be the production of the composite services drawings, representing all of the auxiliary piping systems and HVAC systems on the new Canadian Patrol Frigate. With the aid of state-of-the-art software these drawings can be produced in overlay fashion or isometric to identify potential fouling points. Other uses of the CAD/CAM will include numerical control and material nesting programs with supplementary programs for frame bending and plate shaping.

The IBM 3600 in VVSI data processing group is at present using in-house software for its management information systems. All of these systems are being upgraded and streamlined to use as much common input as possible. The systems involved are:-

Project Management (Project Management includes the manhour and cost monitoring per project), Payroll, Data Management, Material Management, Deviation and Design Change Control Management, Configuration Management, Network Planning and Scheduling.

There is a continual review of the management process and management chain to ensure accountability and authority, and to maintain a contemporary awareness of evolving management technology.

MDDO BACKGROUND

A. HISTORY - from 1949 to 1972 the NCDO contract was directed to and managed by Canadian Vickers Ltd., Montreal. In 1972 and thereafter until 1985 the contract, now MDDO, became competitive and MSEI continued to win the contract until 1989 when it became a directed contract for a 3 + 2 year term. In 1979 Vickers-Stanwick, the company that is now MSEI was formed to exploit the expanding capabilities of its personnel and to take on work in addition to the MDDO Contract. In 1981 the company was acquired by Versatile Corporation and subsequently in 1987 by MIL Group when its name was changed to MSEI.

B. SOME DETAILS OF MDDO CONTRACT

1. **NUMBER OF TASKS BY CONTRACT TERM**

Date	No. of Tasks
1979 - 1982	236
1982 - 1985	149
1985 - 1989	499
1989 Oct. to date	405
	1289

2. **MAJOR TASKS (WITHIN MDDO CONTRACT)**

a) Design Agent for IROQUOIS CLASS SHIPS

MDDO has been the Design Agent for this class since its inception as the DDH 280 class, throughout the TRUMP Program and to date in the creation of the current configuration baseline (25 years of continuity).

N.B. MSEI (MDDO) has been designated as the D.A. for all classes of Canadian Naval vessels since 1949 during their design, construction and conversion phases.

b) Design Agent for ANNAPOLIS CLASS Ships

MDDO was the Design Agent for this Class from 1961 to 1981 when the design agency reverted to NEU(A).

c) MSEI (MDDO) is the only private commercial company to have been accorded Design Agency status.

d) DELEX (Destroyer Life Extension Program)

MDDO was responsible for the management of the design integration of numerous DELALT (Shipalts for DELEX) packages into a series of combined TDPs suitable for the conversion of the DELEX Class vessels.

e) CFAV Riverton

MSEI (MDDO) was responsible for the conversion design for the reconfiguration of the SCHMITT LLOYD 112 into a General Purpose Auxiliary Vessel.

f) HMCS ANTICOSTI & HMCS MORESBY

MSEI (MDDO) prepared all engineering and production drawings to convert two commercial oil rig supply ships into Naval Reserve Minesweeping Vessels.

g) DESIGN STUDIES

MSEI has been tasked under MDDO:

i) to develop a concept design for a Multi-role Support Vessel (MRSV) providing General Arrangements, Major Equipt. List, Stability Report and Class D Cost Estimate.

ii) To provide a report and oral presentation of a Feasibility Design Plan for a CPF Variant for the CASSEV Mission, complete with cost and schedule implications.

iii) To develop a design and production cost analysis and schedule for the installation of a new foremast for HMCS Protecteur.

iv) To develop a Class D cost estimate and schedule for the design and incorporation of crack-arresting strakes in HMCS Cormorant.

v) To provide ECP Packages for the correction of steam deficiencies in IROQUOIS Class ships and to integrate and time-phase engineering changes to No. 2 and 3 Gas Turbine Generator Enclosures.

3. MAJOR TASKS (MSEI)

a) TRUMP Program

MSEI was responsible for the ship platform conversion design, the ship systems integration design and the installation and construction TDP comprising working drawings, Bills of Material, Consolidated Material Lists and Weight and Stability Reports for the TRUMP Program.

In addition, MSEI provided to the shipyard a team of on-site engineers (Vanguard Team) to assist the shipyard in the resolution of productivity problems. Another team of technologists was provided to create (Work Description, Inspection and test Packages (WDITPs) to facilitate the scheduling of production trades in the shipyard.

b) CPF Program

MSEI was involved in the CPF Program from the Source Qualification Phase in 1978, the Contract Definition Phase and finally as Design Agent for 100% of the Concept Design and some 70% of the ship platform working drawings. MSEI also provided to MIL SOREL a twelve-man team of technologists to prepare WDITPs.

c) SMART SHIP (Strategic Multi-role Aid & Replenishment Transport)

MSEI has developed the design of the SMART Ship as the fifth iteration of a series of designs responding to similar demands. The strength of the design is in the vessel's versatility to perform various functions in response to a variety of contingencies such as:

- Personnel deployment
- Equipment transportation
- Pollution clean-up
- Disaster relief
- Auxiliary supply

This series of designs has been entirely self-funded.

4. **AVERAGE COST OF COMPLETED PROJECTS OF CURRENT & MDDO CONTRACT (1989 TO DATE)**

a) Closed Tasks

Actual $ = $10,216,913.

Projects = 340

Average $/Task = $30,050.►

b) Closed & Open Tasks

Estimated $ = $21,467,986.

Projects = 502

Average $/Task = $42,765.►

c) Lowest Tasking Value (B263) = $2,347.►

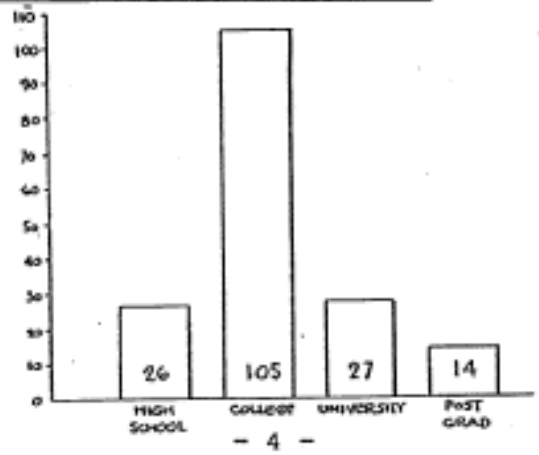
d) Highest Tasking Value (B170) = $337,821.►

5. **PERSONNEL**

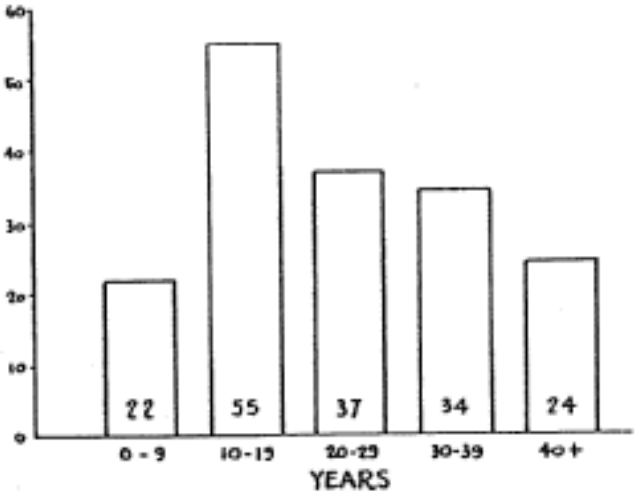
There is a core of personnel who most frequently are involved in MDDO work. Analysis show that the 'core' numbers approximately 60 people. They have a combined total service of 770 years which derives on average service of 12.83 years per person.

Within this core, there is a cadre of some 11 people who worked in the NCDO (the fore runner of MDDO) in Montreal at Vickers. These 11 have a combined service of 355 years or an average of 32.27 years of continual service to MDDO.

PERSONNEL - EDUCATION BACKGROUND



PERSONNEL - YEARS OF EXPERIENCE IN INDUSTRY



6. **GENERAL COMMENTS**

a) Taskings

The most significant task that falls under the umbrella of Design Agent is the establishment and maintenance of a configuration baseline of the ship, its systems and the ECPs that impact them.

Currently MSEI (MDDO) is undertaking the onerous task of integrating the TRUMP working drawing information, the results of the ship systems survey and the rationalized list of approved ECPs into a TDP comprising As-fitted and Selected Class drawings.

The survey conducted by DGMEM LCMMs and MSEI (MDDO) personnel has been mutually beneficial and has created a close-knit working relationship between the LCMMs and MSEI personnel.

A concurrent and related task is the establishment of a relational date base which will ultimately collect and manage information for Data Lists, Equipment Registration Numbers, Equipment Support Lists, materials, drawings, specifications and ECP's.

b) Location

While the MDDO Contract is managed in the Ottawa office, the taskings are distributed to the East and West Coast offices of MSEI when it is

appropriate to do so. When assistance is required by the Ottawa office, the coastal offices are asked to provide such assistance (e.g. short term lift-offs, data retrieval from dockyards).

The work has been distributed between the three offices of MSEI thus:

	Ottawa	Halifax	Victoria
To Sept. 92	66%	16%	18%
To July 93	70%	14%	16%

N.B. - % represents percentage of contract revenue to date.

c) Intergraph

Intergraph CAD system is playing a major role in the configuration baseline tasking. It is the system of preference by DND and DSE have recognized MSEI as a leader in its use. To that end they have asked if their NEU Drawing Office chiefs can visit MSEI to see our CAD operation in action. Furthermore, it is expected that MSEI will be asked to formulate CAD standards and to undertake the task of updating the CFTO's related to drawings with particular reference to electronic presentations.

d) Continuity

MSEI (and predecessors) have held the MDDO Contract for 45 years of unbroken service!

JRW

18 APRIL 94

AS REQUESTED

ST LAURENT CLASS

		COMMISSIONED	BUILT BY	CONVERSION RECOMMISSIONING
DDE 205	ST LAURENT	OCT 55	VICKERS	JAN 66
DDE 206	SAGUENAY	DEC 56	HALIFAX	MAY 65
DDE 207	SKEENA	MAR 57	BURRARD	AUG 65
DDE 229	OTTAWA	NOV 56	VICKERS	OCT 64
DDE 230	MARGAREE	OCT 57	HALIFAX	OCT 65
DDE 233	FRAZER	JUNE 57	YARROWS	AUG 66
DDE 234	ASSINIBOINE	AUG 56	MIL SOREL	JUNE 63

Destroyer Escort

- 2900 tons deep displacement
- 2 - twin 3"/50 guns, 1 - twin 40mm Bofors
- 3 barrel MK 10 A/S Mortars.
- 2 sets - main and cruise turbines, double reduction gear box
- 2 - 400 KW steam generators
- 3 - 200 KW diesel generators.

ST LAURENT CLASS CONVERSION:

Modifications included:

- Removal of the after 3"/50 gun and one mortar
- Extension and recessing of stern for VDS installation
- Fitting of twin funnels
- Erection of Helicopter Hangar
- Strengthening of Flight and Hangar Deck Structure
- Installation of Securing gear and tracks for 2 SeaKings

REFITS.

- Frazer, Ottawa, Skeena underwent major refit in 1977-1978
- Saguenay, Margaree and Assiniboine " " " " 1978-1979
- Saguenay underwent $7.5m refit in 1986.

RESTIGOUCHE CLASS.

		COMMISSIONED	BUILT BY	CONVERSION RECOMMISSIONING DATE
DDE 235	CHAUDIERE	NOV 59	HALIFAX	DECOM'D 74
DDE 236	GATINEAU	FEB 59	DAVIE	72
DDE 256	ST CROIX	OCT 58	MIL SOREL	DECOM'D 74
DDE 257	RESTIGOUCHE	JUNE 58	VICKERS	73
DDE 258	KOOTENAY	MAR 59	BORRARD	73
DDE 259	TERRA NOVA	JUNE 59	VICTORIA	OCT 68
DDE 260	COLUMBIA.	NOV 59.	BURRARD	DECOM'D 74

Destroyer Escort
- 2900 tons deep displacement
- 1 - twin 3"/70 gun
- 1 - twin 3"/50 gun
- 2 - 3 barrel MK 10 A/S Mortar
- Machinery - as ST Laurent Class.

IMPROVED RESTIGOUCHE CLASS

Conversion included:

- Removal of 3"/50 gun mounting and ane mortar
- Extension and recording of stern for VDS installation
- Installation of ASROC
- Installation and integration of advanced electronic systems
- Implementation of noise reduction measures for auxiliary machinery.
- Incorporation of air emission systems
- Installation of wide range burners.

DELEX PROGRAM

The following vessels underwent the Destroyer Life Extension (DELEX) Program to varying degrees for various budgets and different planned life extensions

		COST/SHIP	PLANNED EXTEN
DDH 265	ANNAPOLIS	$24 M	→ 94
DDH 266	NIPIGON	$24 M	→ 94
DDE 261	MACKENZIE	$12 M	→ 90 - 93
DDE 262	SASKATCHEWAN	$12 M	→ 90 - 93
DDE 263	YUKON	$12 M	→ 90 - 93
DDE 264	QU'APPELLE	$12 M	→ 90 - 93
DDE 256	GATINEAU	$22 M	→ 91 - 94
DDE 257	RESTIGOUCHE	$22 M	→ 91 - 94
DDE 258	KOOTENAY	$22 M	→ 91 - 94
DDE 259	TERRANOVA.	$22 M	→ 91 - 94

Conversion included:

- Removal of
  - Plotting System
  - HM Sonar
  - A/S Mortar - Bofors Rocket Launcher
  - VDS
  - VDS Handling Gear
  - FN System
  - 3"/50 Gun Control System
  - Mast.
- Installation of
  - ADLIPS
  - New HM Sonar
  - Anti-ship Missile System - Super RBOC
  - New VDS
  - New VDS Handling Gear
  - Air Search Radar
  - New E-W System & GFC System
  - New Mast
- Relocation of
  - Sewage Collection & Disposal Plant.

AP 18-4-94

TITLE MINE SWEEPING AUXILIARY (MSA)

VESSEL SIZE : DISPLACEMENT 2205 TONS (FULL LOAD).
: DIMENSIONS (m) 58.2 × 13.1 × 5.2

CONTRACT NO. 02MCW8462-8-FG01

CONTRACT AWARD DATE 7 OCTOBER 1989

INITIAL CONTRACT VALUE $426,000

FINAL CONTRACT VALUE $1,369,000

DATE OF DELIVERY FEBRUARY 1990

NUMBER OF PERSON YEARS OF WORK = 16.72

BRIEF DESCRIPTION.

To provide EC TDPs to enable the conversion of two former offshore towing/supply vessels into mine sweeping auxiliary vessels. The total program comprised 45 separate tasks, 37 of which were conversion design changes. There were six revisions to the statement of work over a seven month period the final revision increasing the workload by 56%.

TITLE GENERAL PURPOSE AUXILIARY VESSEL (GPAV)

VESSEL SIZE : DISPLACEMENT 2563 TONS (FULL LOAD)
: DIMENSIONS (m) 63.9 x 13.3 x 5.1

CONTRACT NO. 02MCWB462-8-FG01

CONTRACT AWARD DATE 7 OCTOBER 1989.

INITIAL CONTRACT VALUE $694,200 * (413,244)

FINAL CONTRACT VALUE $774,130

DATE OF DELIVERY FEB 1990

NUMBER OF PERSONYEARS OF WORK = 9.45

BRIEF DESCRIPTION.

To provide EC TDPs to enable the conversion of an offshore supply and support vessel to a general purpose support ship. The total program comprised 29 separate tasks, 25 of which were conversion design changes. There were four revisions to the statement of work prior to the first estimate (*) being completed after three months. Two more revisions to the S-O-W followed in the next three months. The 'guess-timated' value of the initial S-O-W is $413244. Increase in workload would be 87%.

JRW

The Naval Central Drawing Office was established in 1949 in response to a DND requirement to produce new construction and installation drawings and specifications for the RCN beginning with the St. Laurent Class for which Canadian Vickers Ltd was the lead-ship yard. The NCDO was established and operated by Canadian Vickers under contractual arrangements with the then Department of Defence Production (subsequently DSS and now PWGSC)

The NCDO organization has had several name changes viz. CFTSD, NSDA, MSS and now MDDO.

In 1958 a companion organization was formed for the procurement and distribution of all non-GSM and was called Naval Shipbuilding Central Procurement Agency. This was managed under a separate but parallel contract to NCDO by Canadian Vickers.

The NSPCA was disbanded in 1970 as a separate entity and the procurement responsibility was transferred to individual shipyards with the advent of the DDH 280 Class building program.

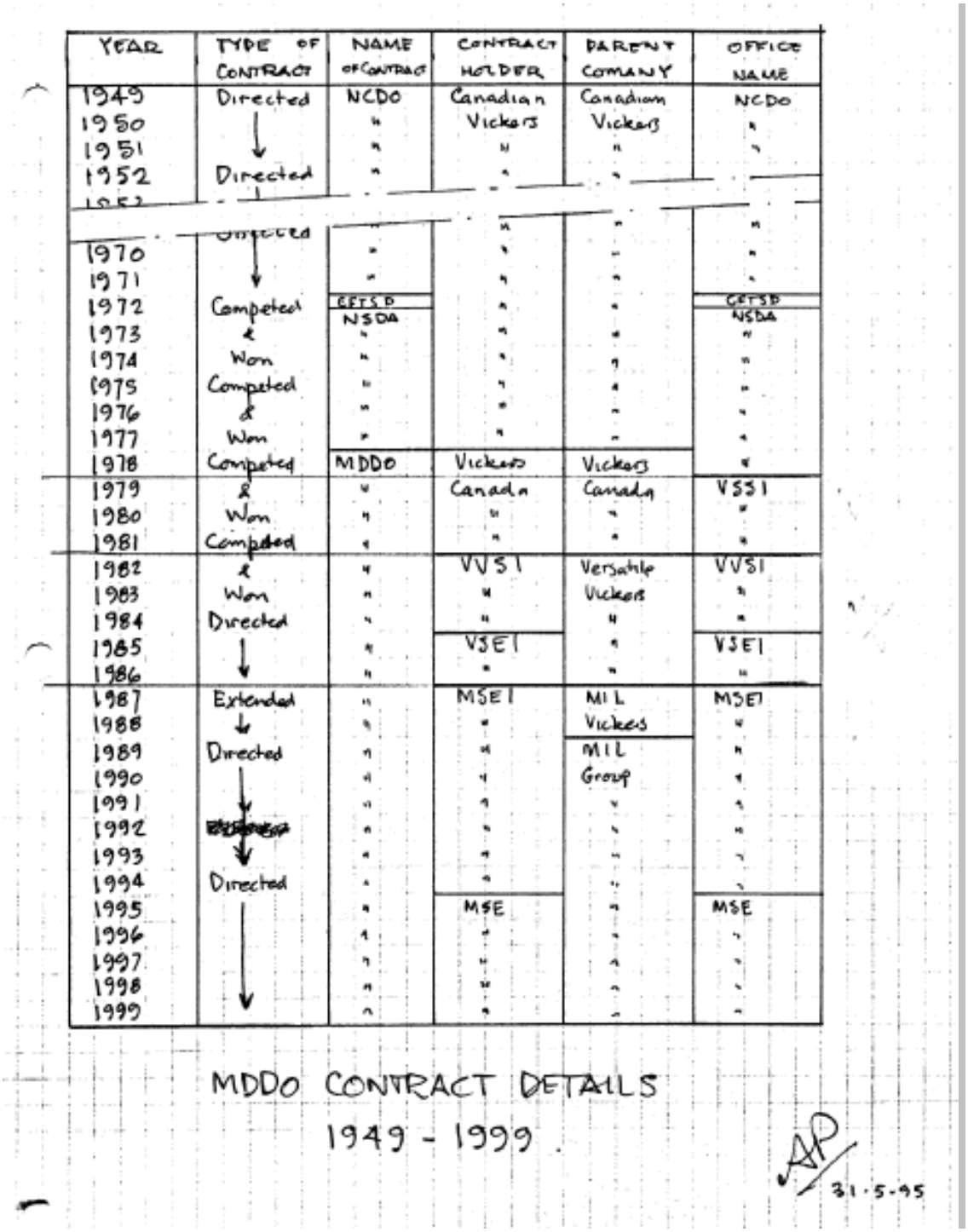
Since NCDO/MDDO was such a lucrative contract, other marine consultants and personnel organizations lobbied for a competitive process to be put in place and 1972 saw the first such competition.

The contract for NCDO/MDDO had been first signed in 1949 for nominal three year periods and had been renewed with Canadian Vickers until 1972. In 1972, Vickers competed for the contract

and was successful. This success was repeated in 1975, 1978, 1981 then in 1984, the contract was directed to Versatile Vickers ~~Inc~~ Systems Inc. This contract was extended by two years until 1989 whereupon ~~it~~ a new contract was directed to MIL for another 3 years plus 2 optional years. The extension brought us to 1994 where a five year contract was directed to MIL Systems.

31.5.95

(See attached matrix)



YEAR	TYPE OF CONTRACT	NAME OF CONTRACT	CONTRACT HOLDER	PARENT COMANY	OFFICE NAME
1949	Directed	NCDO	Canadian	Canadian	NCDO
1950	↓	"	Vickers	Vickers	"
1951	↓	"	"	"	"
1952	Directed	"	"	"	"
1953	↓	"	"	"	"
1954	↓	"	"	"	"
1955	↓	"	"	"	"
1956	↓	"	"	"	"
1957	↓	"	"	"	"
1958	↓	"	"	"	"
1959	↓	"	"	"	"
1960	↓	"	"	"	"
1961	↓	"	"	"	"
1962	↓	"	"	"	"
1963	↓	"	"	"	"
1964	↓	"	"	"	"
1965	↓	"	"	"	"
1966	↓	"	"	"	"
1967	↓	"	"	"	"
1968	↓	"	"	"	"
1969	↓	"	"	"	"
1970	↓	"	"	"	"
1971	↓	"	"	"	"
1972	Competed	CFTSD	"	"	CFTSD
1973	&	NSDA	"	"	NSDA
1974	Won	"	"	"	"
1975	Competed	"	"	"	"
1976	&	"	"	"	"
1977	Won	"	"	"	"
1978	Competed	MDDO	Vickers	Vickers	"
1979	&	"	Canada	Canada	VSSI
1980	Won	"	"	"	"
1981	Competed	"	"	"	"
1982	&	"	VVSI	Versatile	VVSI
1983	Won	"	"	Vickers	"
1984	Directed	"	"	"	"
1985	↓	"	VSEI	"	VSEI
1986	↓	"	"	"	"
1987	Extended	"	MSEI	MIL	MSEI
1988	↓	"	"	Vickers	"
1989	Directed	"	"	MIL	"
1990	↓	"	"	Group	"
1991	↓	"	"	"	"
1992	↓	"	"	"	"
1993	↓	"	"	"	"
1994	Directed	"	"	"	"
1995	↓	"	MSE	"	MSE
1996	↓	"	"	"	"
1997	↓	"	"	"	"
1998	↓	"	"	"	"
1999	↓	"	"	"	"

MDDO CONTRACT DETAILS
1949 - 1999.

AP
31-5-95

JRW

PROJECTS PER CONTRACT TERM

YEAR	PROJECTS
1978-81	236
1981-84	149
1984-89	499
1989-94	666
1994 TO DATE	105
	1655

N.B. Many of these projects were multi-tasked e.g.

DELEX ≈ 25 tasks/project

ISTDP ≈ 15 tasks/project

31.5.95

JRW

MDDO STATISTICS.

APPENDIX A
TO 19 JULY 93 MEMO.

TOTAL VALUE OF OPEN & CLOSED PROJECTS
ACTUALS + ETCs
LABOUR + ODCs
= 21,467,986

TOTAL PROJECTS OPEN & CLOSED = 502

∴ AVERAGE TASKING VALUE = $42,765

LOWEST TASKING VALUE (B263) = $2,347

HIGHEST TASKING VALUE (B170) = $337,821

AP 20-7-93

MIL Systems

TASK DISTRIBUTION

- A REVIEW OF 2214 MDDO TASKINGS SHOWS THAT DISTRIBUTUON HAS BEEN AS FOLLOWS :---

  ---- 602 (27 %) FOR COMBAT SYSTEMS

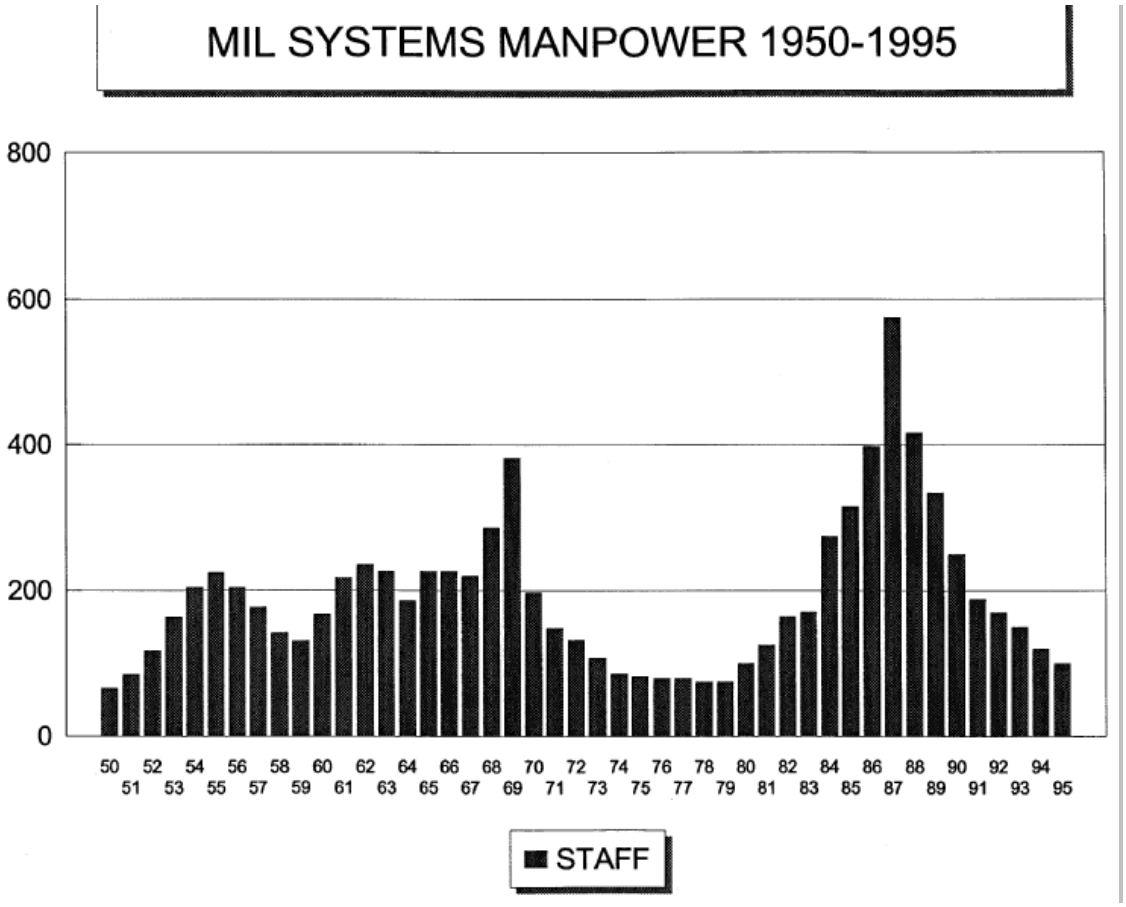
  ---- 844 (38 %) FOR MARINE SYSTEMS

  ---- 746 (34 %) FOR HULL SYSTEMS

  ---- 22 (1 %) FOR MISCELLANEOUS REQUESTS

The caption of the following chart should more accurately read:

"NCDO/MDDO MANPOWER 1950 – 1995"



The following tabulation covers the categories of personnel required for the NCDO/MDDO work, as drawn up by MIL Systems Engineering and approved by DND.

MDDO CLASS NO.

01 **MDDO MANAGER**

Minimum of 10 years experience in Naval Ship Design/System Design/ Shipbuilding and repair technology. Minimum of 10 years of progressively responsible management experience. Degree or Certificate in Naval Architecture/Marine Engineering or related subjects. Demonstrated capability in managing large/complex programs and Program Management Systems including CS^2 and Configuration Control.

04 **DEPUTY MANAGER**

Minimum of 10 years experience in naval related technologies. Minimum of 5 years of progressively responsible administrative experience. Degree or Certificate in marine related subjects. Previous experience in Program Management Systems including CS^2 and Configuration Control.

13 **DESIGN SPECIALIST I**

Minimum of 5 years experience in field of specialization and 2 years in naval engineering environment. Ability to take TSORs to next level of development. Capable of preparing system specifications, analyzing work packages, co-ordinating estimates and schedules. Degree or Certificate in field of specialization.

14 **DESIGN SPECIALIST II**

Minimum of 2 years experience in field of specialization in marine engineering environment. Ability to take technical guidance prepared or reviewed by Design Specialist I to subsequent levels of design development. Capable of performing design calculations to validate design and requirements compliance. Ability to estimate and schedule work packages. Degree or Certificate in field of specialization.

07 **CHIEF DRAFTSMAN**

Minimum of 10 years experience in naval ship design/shipbuilding drawing office. Minimum of 10 years progressively responsible supervisory experience and CAD management. Demonstrated ability to review, organize and schedule work. Comprehensive knowledge of drafting standards. Experience in program management concepts such as CS^2 and Configuration Control. Degree or Certificate in Naval Architecture/Marine Engineering or related subjects.

16 **DESIGNER DRAFTSMAN**

Minimum of 10 years experience in field of specialization and minimum of 5 years experience in naval marine industry. Ability to review TSORs for creation of work packages, estimates and schedules, to perform design calculations and prepare reports. Ability to create technical guidance for Intermediate and Junior Draftsmen, comprehensive knowledge of drafting

standards. Familiarity with program management techniques and CAD Management. Certificate in Naval Architecture/Marine Engineering or related subject.

19 **INTERMEDIATE DRAFTSMAN**

Minimum of 5 years experience in Ship Design/Shipbuilding drawing office. Capable of undertaking drafting work and materials take-off as directed by the Chief Draftsman/Designer Draftsman. Comprehensive knowledge of drafting standards. Capability of using CAD techniques. Certificate in marine related subjects, drafting or completion of an apprenticeship program.

22 **JUNIOR DRAFTSMAN**

Up to 5 years experience in Ship Design/Shipbuilding or allied industry drawing office. Capable of undertaking drafting work under the supervision of the Chief Draftsman/Designer Draftsman or Intermediate Draftsman. Knowledge of drafting standards. Ability or in training to use CAD. Certificate in drafting.

25 **SENIOR TECHNICAL OFFICER**

Minimum of 10 years experience in field of specialization as well as 5 years naval marine related experience. Works independently with comprehensive knowledge of ship systems and their design. Plans schedules and directs work of other Technical Officers Certificate in engineering technology or equivalent academic and practical experience.

28 **INTERMEDIATE TECHNICAL OFFICER**

Minimum of 3 years experience in field of specialization and 2 years marine related experience. Works under minimum supervision and is familiar with ship systems design and development. Capable of preparing reports and system specifications. Certificate in engineering technology or equivalent academic and practical experience.

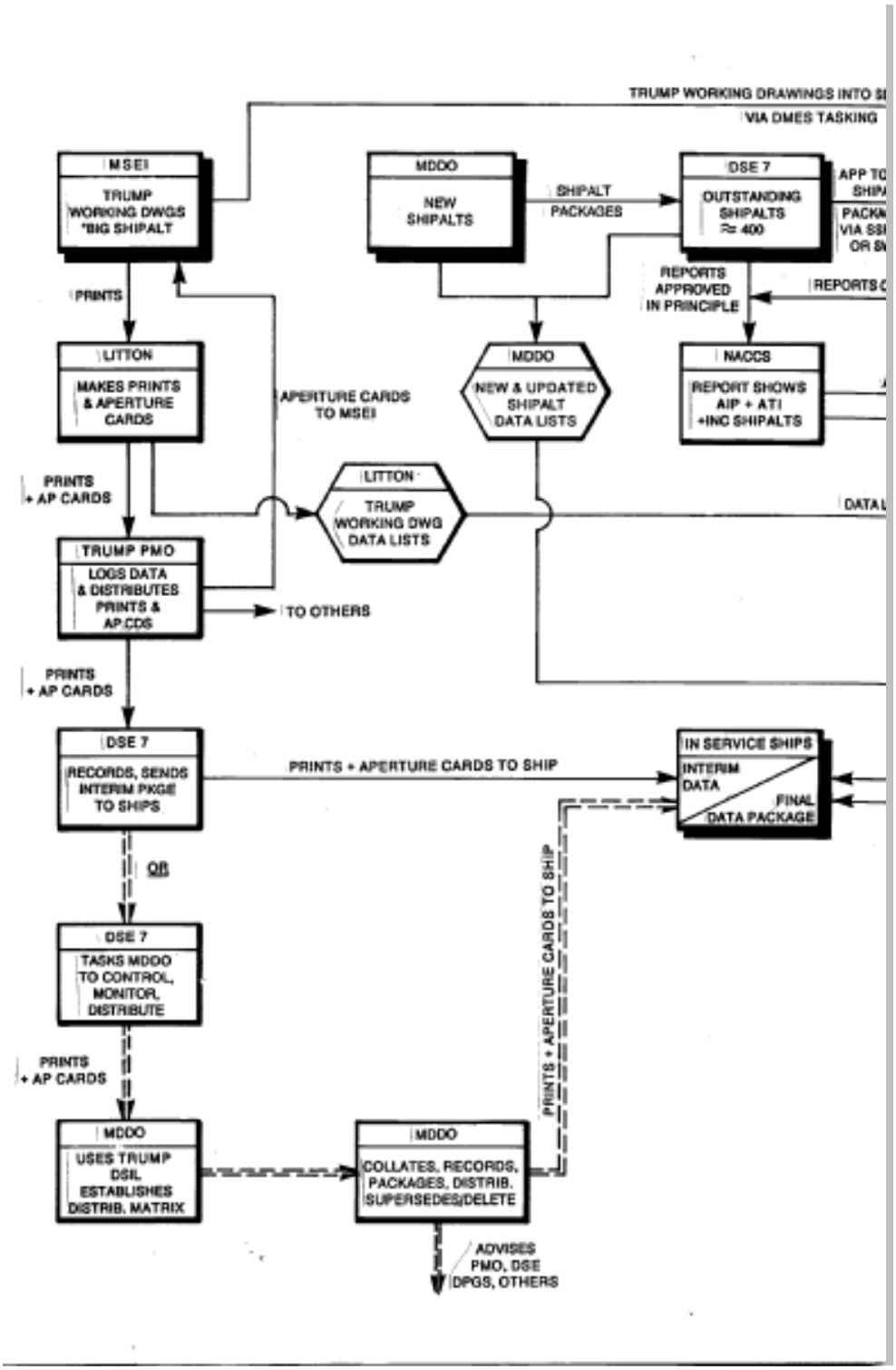
31 **JUNIOR TECHNICAL OFFICER**

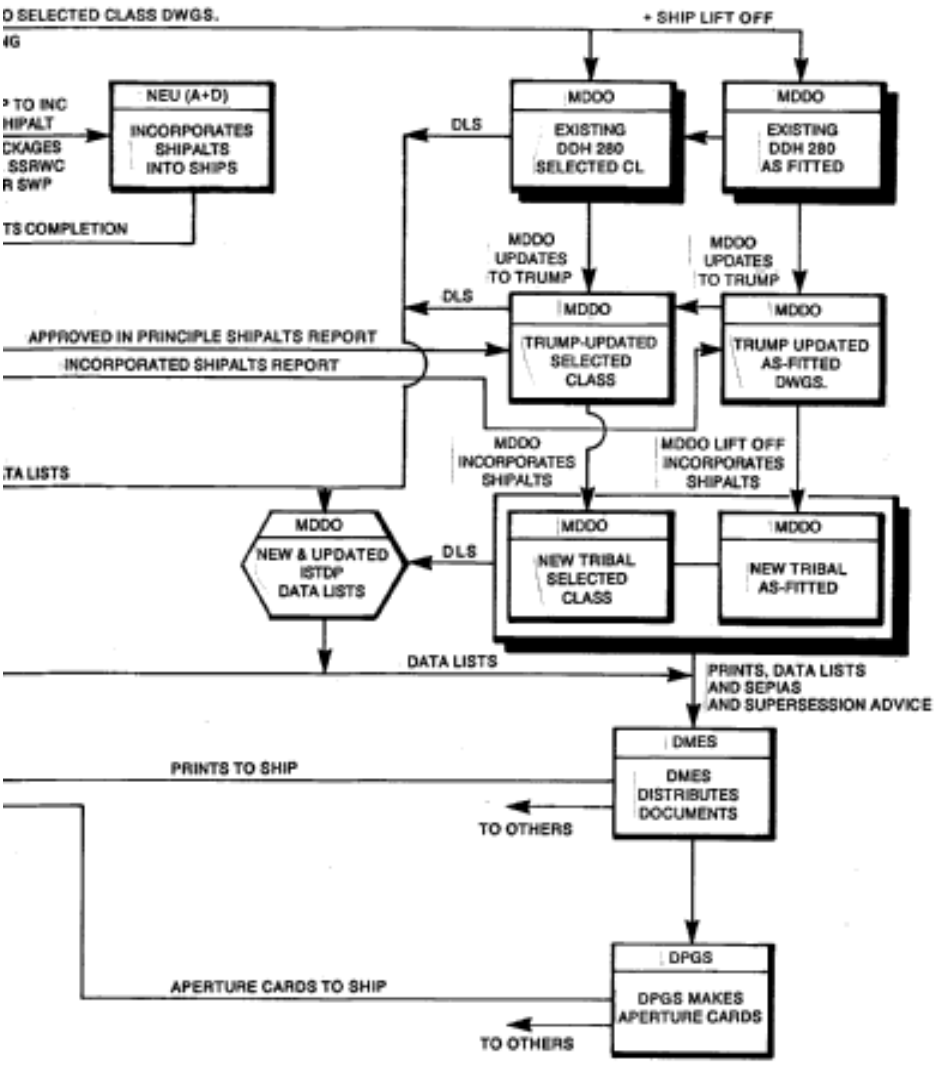
Up to 3 years experience in field of specialization with some marine related experience. Works under supervision to prepare reports and contributions to systems specifications. Knowledge of ship systems and their functions with certificate in engineering technology, High School Diploma and related practical experience or completion of apprenticeship program.

34 **CLERICAL**

Minimum of 2 years experience in clerical support. Ability to administer documentation, control and maintain computer data, generate reports and produce schedules and matrices. High shcool diploma required as well as advanced computer skills.

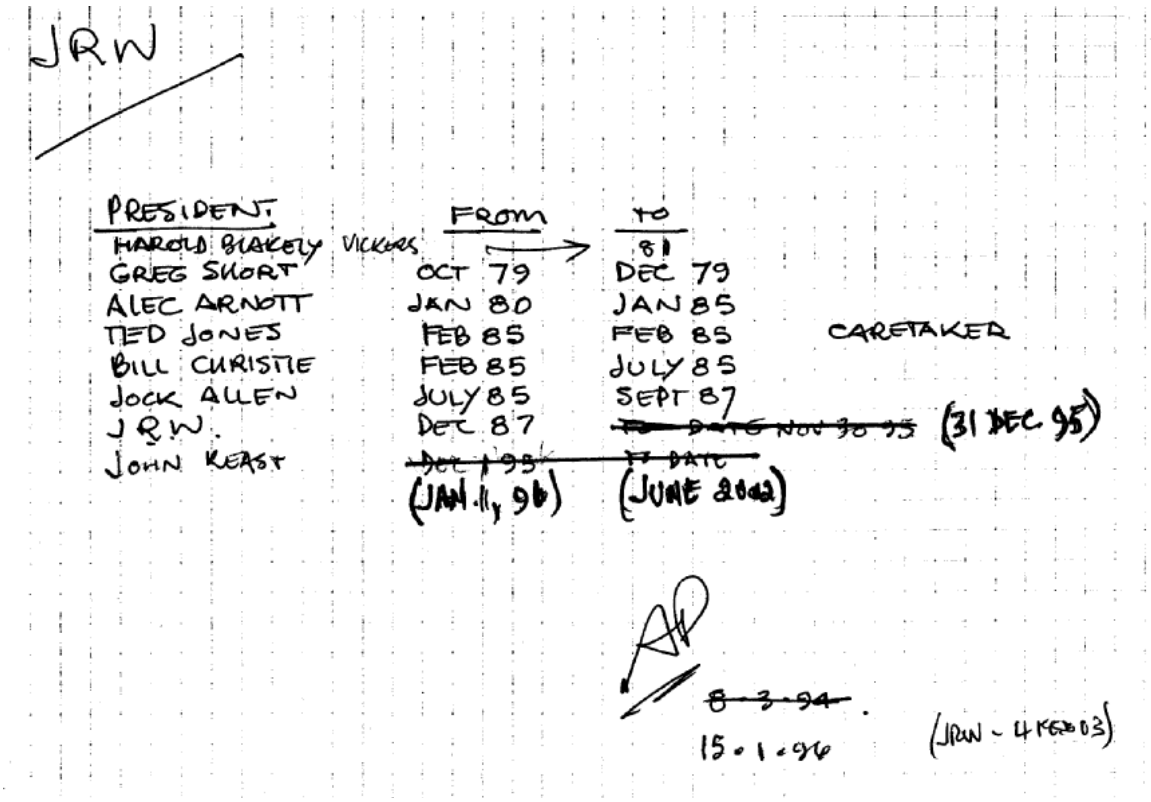
The following chart is a typical procedure for conversion projects, and is taken from the TRUMP program. MSEI was the acronym for MIL Systems Engineering Inc.


TRUMP WORKING DRAWINGS INTO SI
VIA DMES TASKING
MSEI
TRUMP WORKING DWGS *BIG SHIPALT
MDDO
NEW SHIPALTS
SHIPALT PACKAGES
DSE 7
OUTSTANDING SHIPALTS ≈ 400
APP TO SHIP
PACKA
VIA SSI
OR SN
REPORTS APPROVED IN PRINCIPLE
REPORTS C
PRINTS
LITTON
MAKES PRINTS & APERTURE CARDS
APERTURE CARDS TO MSEI
MDDO
NEW & UPDATED SHIPALT DATA LISTS
NACCS
REPORT SHOWS AIP + ATI +INC SHIPALTS
PRINTS + AP CARDS
LITTON
TRUMP WORKING DWG DATA LISTS
DATA L
TRUMP PMO
LOGS DATA & DISTRIBUTES PRINTS & AP CDS
TO OTHERS
PRINTS + AP CARDS
DSE 7
RECORDS, SENDS INTERIM PKGE TO SHIPS
PRINTS + APERTURE CARDS TO SHIP
IN SERVICE SHIPS
INTERIM DATA
FINAL DATA PACKAGE
OR
DSE 7
TASKS MDDO TO CONTROL, MONITOR, DISTRIBUTE
PRINTS + AP CARDS
PRINTS + APERTURE CARDS TO SHIP
MDDO
USES TRUMP DSIL ESTABLISHES DISTRIB. MATRIX
MDDO
COLLATES, RECORDS, PACKAGES, DISTRIB. SUPERSEDES/DELETE
ADVISES PMO, DSE DPGS, OTHERS



ACTIVITY SEQUENCE FOR CONTROL, DISTRIBUTION & UPDATE OF SHIPS IN-SERVICE DATA PACKAGES

CORPORATE PRESIDENTS of the NCDO/MDDO WORK, 1949 - 2002



The foregoing is Alex's hand written note of the successive Presidents of the NCDO/MDDO work. Initially, the work was done as an ***integrated part*** of Canadian Vickers under that company's President Harold Blakely and so did not have an appointed "President" until October of 1979. This was the point in time when the NCDO contract was put out to competitive tender, and Canadian Vickers reconstructed its corporate entity by forming, with Stanwyck of the USA, a ***stand alone corporate entity*** for the work, Vickers Stanwyck Systems Inc. The new entity required a President separate from Canadian Vickers, and Greg Short was appointed as interim to set up the new corporate operation. Alec Arnett had been the Navy Coordinator at Canadian Vickers for the past few years, and retired from the Navy and became available to head up the new company in January 1980.

3.5

Some Reflections of Ship Design 1949 to 1989

by Bill Craig, past Design Manager MSEI
Extracted from his article in MIL SOUNDINGS, Sept. 1989 (6)

Ship design, as we all know, is an integral part of MSEI's work, and now as we celebrate our 40th anniversary, it seemed appropriate to take a look at the evolution of this facet of our industry and to examine some of the changes which have taken place over the last few decades…….***so starts Bill Craig's article for inclusion in the MIL Systems Engineering company News Letter Volume 2, Issue 4 – his article is continued verbatim.***

In the old days of shipbuilding some 30 or more years ago, thoughts of computers, producibility and pre-outfitting, although acknowledged, were not high on the priority list. Lack of competition had resulted in apathy, and outmoded facilities and equipment. The design/drawing office was very much a part of this system issuing in most cases minimal information to the shop floor relying on a work force having a higher skill level than exists today. Producibility comments came in the colourful vernacular of foremen platers and loftsmen, comments I am sure most of us would like to forget.

Design and production was carried out without the assistance of even hand calculators let alone computers. Having said this, it was a labour intensive and costly approach particularly when measured against the growing competition from West Germany and Japan. Both of these countries had their facilities and equipment re-built and replaced after World War II. Due to the lack of a skilled work force, they established training programmes and expanded on new production techniques developed by U.S. shipbuilders during the war. This produced ships more efficiently, with smaller work forces, in less time, at reduced cost. They achieved this with the emphasis on production planning, which in turn required the design/drawing office to take notice of production requirements.

It was in the late 50's/early 60's against a worsening market situation that I recall new technology reaching my neck of the woods. Unit construction was underway, shipyards and equipment were being rebuilt and replaced, tenth scale lofting was in place along with Numerically Controlled (NC) profile burners and later by NC bending machines. Computers, still in their infancy, were being applied to data processing. With the advent of large tankers many of which were too big to be built in the conventional way, the requirements of unit construction and pre-outfitting of machinery and piping systems prior to launch were now impacting the design and drawing process. The term "design-for-production" was becoming more common and more important.

The interim years of the DDH 280 design and construction and the early stages of the CPF saw a steady expansion in the use of computers for planning, production control and other administrative functions. The development made in NC burning and bending

machines was part of the natural progression towards more sophisticated computer based shipbuilding systems. It was in ship structure that a major breakthrough was made from numerical definition of molded form lines and primary structure to high level parts definition which could be used to describe piece part geometry. While this did not immediately affect the drawing office, further development with the objective of creating preliminary design from initial concept did, and from this perspective the skills of the loftsmen and draughtsman designers began to integrate.

The 80's saw rapid development in computer technology both in software and hardware. Coincident with this was the promulgation of the CPF and some Coast Guard fast-track programs. The shipbuilding industry acknowledged that performance had to improve, initiatives such as zone oriented construction were put in place with the full impact being felt by the design and drawing offices. New terms were being heard, "hot work, cold work, family of drawings, ship log numbers, product work centre numbers, on block, on board".

It is fair to say that all this caused considerable upheaval in the design and drawing office and while the aims and merits of new production methods were good, they could only be measured by time. The application of these developing technologies to the new building programs created start-up problems such as the lack of time to resolve the intricacies to make it work. The days of issuing a few succinct instructions to the shipyard were gone forever. When we look to the future it should be with the anticipation and enthusiasm of the design and drawing offices' growing role in the production engineering equation. The purchase and participation of our own CAD system in past and present programs, its future development and the enthusiasm which our staff have demonstrated serves to prove that combined with sound production engineering principles, the designer can continue to adapt to changing production engineering requirements. The days of evolutionary change have gone, our industry demands that planning for change be a cornerstone of our future philosophy.