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News

CANADIAN NAVAL TECHNICAL HISTORY ASSOCIATION

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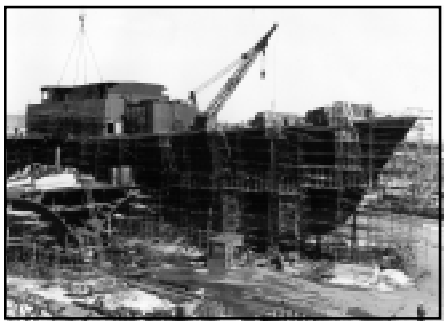

CNTHA News **Est. 1997**

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New group to look at navy's industrial history

In late November a group of about 20 interested people gathered in downtown Ottawa for a special meeting of the Canadian Naval Technical History Association. In addition to many of our usual members, half a dozen new participants joined us at the request of Rolfe Monteith to discuss the challenge of assembling the story of the industrial side of our naval technical heritage. As many of you know, Rolfe is one of our association's founding fathers, but to me he also represents our "conscience." When Rolfe calls from somewhere in England, asking — "How's it going?" — things tend to get going as a result! This occasion was one such event.

Rolfe Monteith

Phil Munro

While it is still early days, a core of interested people has started to construct a framework around which the history of Canada's naval industry can be preserved. I am most pleased to see this new initiative. Anyone wishing to tune in or contribute is invited to connect up with Jim Williams at jarowill@sympatico.ca. Others currently engaged in this activity are: Don Jones (group leader), Doug Hearnshaw, Colin Brown, Gord Moyer and Brian McNally.

Alas, another of our founding members, Phil Munro, has announced that he will be stepping down from the executive of the CNTHA. Over the years, Phil has performed sterling duty in managing our ever-growing collection of documents. On behalf of the Association, I want to thank Phil for his service and guidance along the way. We hope that he will be able to continue to participate in our meetings.

If anyone is interested in taking over the important job of reviewing and cataloguing documentary contributions to the CNTHA before they are sent on to the Directorate of History and Heritage, please contact me at michael.saker@gpcinternational.com.

— Mike Saker, Chairman CNTHA

The DDH-280 Design Challenge

Article by Cdr Tony Cond

DDH-280

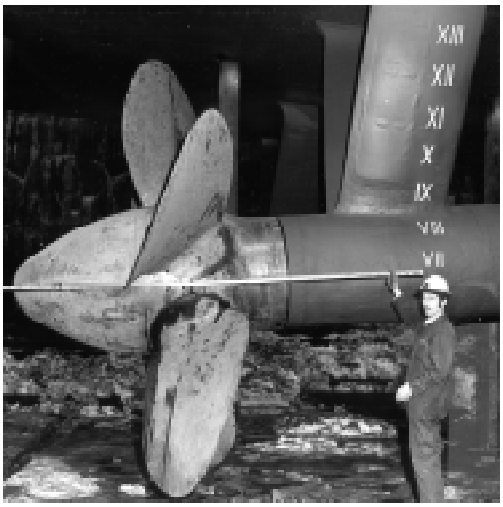
DDH-281

DDH-282

DDH-283

In 1970 Canada's sagging shipbuilding industry received a small, but much-needed boost when the government gave its approval for a class of four warships to be designed and built in this country. Competition was fierce as industry sparred excitedly for the rare contracts.

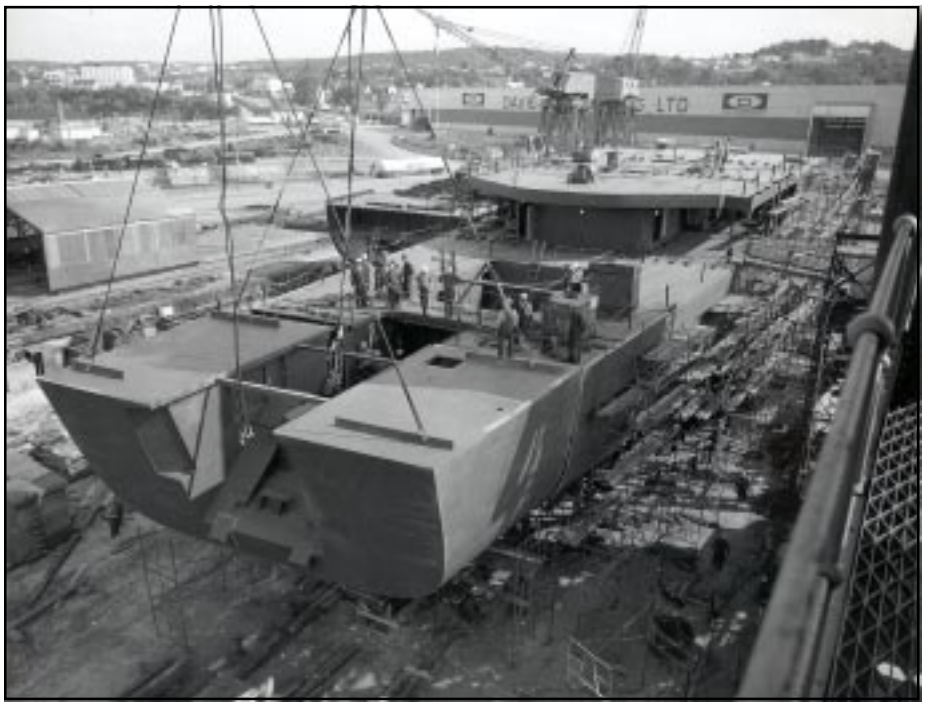
This next generation of ship for the Canadian navy would build on the extensive innovations envisioned for the *St. Laurent*-class destroyer escorts. It would be gas-turbine powered and incorporate an integrated and automatic digital information display system for command and control. In an attempt to reduce the number of sailors required to man the ships, and to improve habitability and provide more space for equipment, the navy would also introduce automatic combustion and machinery control. Canada was about to rewrite the state of the art, and in short order the four ships of the DDH-280 class, *Iroquois*, *Huron*, *Athabaskan* and *Algonquin* — these "Sisters of the Space Age" — would take their place as flagships of the Canadian naval fleet.



Naval engineers developed an innovative fix for inherent problems with the DDH-280's controllable pitch propellers (*Athabaskan*'s screw is shown here). *(Davie Shipbuilding Ltd. photo)*

The development of the DDH-280 class marked a significant turning point for both the navy and industry. Previously learned lessons in steel fabrication, gas-turbine technology and specialized anti-submarine technology were challenged to the limit. The Canadian navy needed a quiet ship that could conduct extended operations against a wide variety of surface, subsurface and air threats in virtually any sea state. Clearly, the older *St. Laurent* (DDH-205) class could not offer this level of performance; nor could the smaller hydrofoil *Bras d'Or* (FHE-400). Driven by a demanding set of requirements, the Canadian navy became the first western navy to commit to an all-gas-turbine ship. For Canada's modestly sized navy, this was a significant change, one which would affect personnel, support facilities and industrial suppliers for many years to come.

The experience gained from integrating a command and control system for *Bras d'Or* allowed DND to successfully develop the CCS-280 system for its new class of ship. When it went to sea in the early 1970s, the CCS-280 was the best destroyer-sized, integrated command and control system available. The system combined radar data, sonar information, operator-selected electronic warfare bearings, graphic overlays and alphanumerics into a single display that had facilities for weapon system control. A lone operator using the CCS-280 system could detect, track, identify and, if necessary, en-



Job H-670 (HMCS *Athabaskan*) under construction at Davie Shipbuilding Ltd., Lauzon, Québec in July 1970. *(Davie Shipbuilding Ltd. photo)*

gage a contact with the five-inch gun or Sea Sparrow missile system. It was an awesome capability.

A higher level of quietness became a most demanding parameter in the ship's design. To improve the ship's sonar detection capabilities and to prevent enemy submarines from detecting her presence, the ship had to reduce both airborne and hull-transmitted noise to an absolute minimum. Stringent noise and vibration parameters were enforced throughout the ship's development, a practice unknown in earlier ship designs.

Gearing was one of the major sources of hull-transmitted noise. The selection of a combined-gas-or-gas (COGOG) system meant that a relatively complex clutch and reduction-gear installation would be required. Although Canada no longer possessed the technology to build such gearboxes, firm pressure was applied on foreign suppliers during the tendering process to guarantee low levels of noise and vibration, something that had never been asked of them before. After rigorous evaluation the navy selected gearing that met the exacting parameters it had demanded. To ensure even further quieting, the navy required that the entire propulsion plant be resiliently mounted on a single raft — another first for the time.

This sophisticated approach presented a number of interesting design challenges. Because of the very high torque available at low speeds, the mountings had to be married to achieve power balance. Procedures therefore had to be developed for aligning the propulsion machinery during installation, taking into account factors such as temperature change, and construction and launching techniques. Navy engineers and shipbuilders worked together to develop innovative construction procedures, with the satisfying result that both quietness and correct alignment were achieved.

Because the COGOG design implied continuously rotating shafts, engineers specified controllable pitch propellers which would give the system the highest shaft horsepower rating in the world at that time. This came at a price, however. Apart from

(Cont'd on next page)

Tech Specs: DDH-280 Class

Displacement: 4,200 tonnes
Length Overall: 130 metres
Beam: 15.2 metres
Draft: 4.4 metres

Aircraft:
- 2 Sea King CHSS-2 A/S helicopters

Weapons:
- 2 quad Sea Sparrow missile launchers
- 1 single 5"54 Oto-Melara gun
- 1 triple Mk 10 Limbo A/S mortar
- 2 triple Mk 32 tubes for Mk 46 A/S homing torpedoes

Main Engines:
- 2 Pratt& Whitney FT-4 gas turbines (50,000 shp)
- 2 P&W FT-12 cruise engines (7,400 shp)
- 2 shafts

Speed: 29+ knots
Range: 7,500 km at 20 kts
Complement: 245

Source: ***Jane's Fighting Ships***

(Cont'd from page 3)

cavitation and noise difficulties, there was an inherent problem with these propellers. If they were improperly positioned, they could produce excessively high torques and thrusts which could result in potentially severe damage to the gear train and shafting. To study this problem, naval marine engineers developed a simulation model using the analogue computer facilities of the National Research Council of Canada. They ultimately developed a modification to the ship's electro-pneumatic control system so that acceptable ship response times could be achieved without exceeding allowable limits. This was a major success story for navy engineers who were fast becoming very flexible in their approach to new design, and very good at identifying potential problems and developing innovative solutions before the first ship was even constructed.

Cdr Cond is a project director with the Directorate of Science and Technology Maritime (DSTM 2) in Ottawa. This article was excerpted and adapted from his paper, "A Century of Canadian Marine Technology Development," prepared for his Bachelor of Military Arts and Science program at the Royal Military College of Canada.

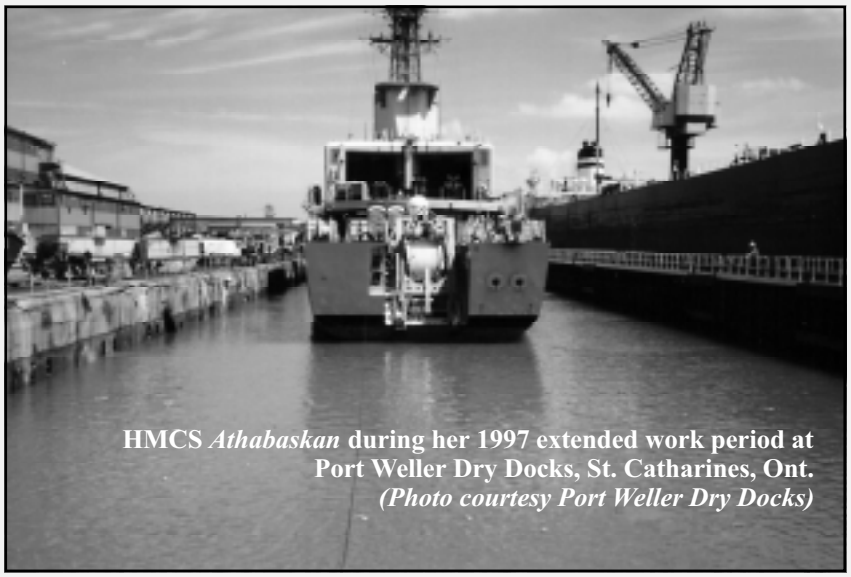
About the CNTHA

The Canadian Naval Technical History Association is a volunteer organization working in support of the Directorate of History and Heritage (DHH) effort to preserve our country's naval technical history. Interested persons may become members of the CNTHA by contacting DHH.

A prime purpose of the CNTHA is to make its information available to researchers and others. The Collection may be viewed at the Directorate of History and Heritage, 2429 Holly Lane (near the intersection of Heron and Walkley Roads) in Ottawa.

DHH is open to the public every Tuesday and Wednesday 8:30-4:30. Staff are on hand to retrieve the information you request and to help in any way. Photocopy facilities are available on a self-serve basis. Copies of the index to the Collection may be obtained by writing to DHH.

Share Your Photos!



HMCS *Athabaskan* during her 1997 extended work period at Port Weller Dry Docks, St. Catharines, Ont.
(Photo courtesy Port Weller Dry Docks)

***CNTHA News* is on the lookout for good quality photos (with captions) to use as stand-alone items or as illustrations for articles appearing in the newsletter. Photos of people at work are of special interest. Please keep us in mind as an outlet for your photographic efforts. Contact Michael Whitby, Chief of the Naval Team, Directorate of History and Heritage, NDHQ Ottawa, K1A 0K2. Tel. (613) 998-7045.**