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News

CANADIAN NAVAL TECHNICAL HISTORY ASSOCIATION

New Way Ahead for CNTHA and CANDIB

After 14 years at the helm of the Canadian Naval Technical History Association, Mike Saker has relinquished his chairmanship of the CNTHA to co-founding member Pat Barnhouse and is moving to Mahone Bay, Nova Scotia. Mike's move provided an opportunity to review the mandates of the CNTHA and its main subcommittee project (CANDIB) investigating naval technology links to Canada's industrial base. In recent years the distinction between the two had become increasingly blurred as more resources were directed toward CANDIB.

Mike Saker steps down as CNTHA Chairman

At a combined CNTHA/CANDIB meeting on November 6, members agreed that the all-volunteer organization should be restructured to allow the CANDIB subcommittee to widen its focus to encompass the broader objectives of the CNTHA under the new chairman. CANDIB itself will remain under the direction of Tony Thatcher, who was newly appointed as the executive director of the CNTHA. CANDIB will continue its work as normal, but has been redesignated as a working group of the CNTHA.

Pat Barnhouse (left) takes over as CNTHA Chairman, while Tony Thatcher continues his CANDIB Project leadership as Executive Director of CNTHA.

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CNTHA Executive Director and CANDIB Project Leader
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FHE-400 in Retrospect

By Rolfe Monteith

A great deal has been written regarding the Canadian Hydrofoil Project of the 1960s. While the media viewed it as yet another DND disaster of escalating costs and program delays, within naval circles it became the centre of attention partly for another reason. Should sea trials of FHE-400 prove the effectiveness of using many relatively cheap hydrofoils to counter the Russian nuclear submarine threat, it could create a dilemma for proponents of large, "blue-water" ships for this purpose.

Setting aside details of how the project escalated from an initial objective of demonstrating the seaworthiness of a 200-ton hydrofoil (estimated cost of $10.1 million) to a complete ASW weapon system costing some $51 million before it was mothballed, it is important to remember what accrued from this. What has not been widely acknowledged is the fact that through the project the navy reaped many benefits in terms of new methods of design and acquisition, weapon systems, and infrastructure that might not otherwise have been developed.

The acquisition process used for the hydrofoil FHE-400 *Bras d'Or* was radically new for the navy. Traditional warship procurement had been based on a detailed specification of the vessel and its systems, linked with comprehensive oversight. For the hydrofoil, a contract was awarded to a prime contractor based upon a statement of requirements and a design concept. This approach was common practice in aeronautics, but presented the navy with an agonizing learning curve. The experience was invaluable, however, as this procedure worked so well it was successfully adopted for follow-on ship new-build programs.

It was deemed important to merge the separate responsibilities of the Department of National Defence and Defence Production into a small joint project office with a project manager responsible for *all* aspects of the program, including in-service support. The navy was breaking new ground throughout the project, and mistakes were inevitably made because of inexperience. Much was learned from these errors, and the benefits were obvious. As with the acquisition process, the

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FHE-400 *Bras d'Or — foilborne!*
(DND photo)

Disposition of Hydrofoil Technology

By Pat Barnhouse

[This edited excerpt is from the author's article, "The Canadian Hydrofoil Project," which appeared in the Winter 1985 issue of the *Journal*.]

The computer-based command and control Action Information System (AIS) developed for HMCS *Bras d'Or* required the formation of a naval programming team at Westinghouse in Hamilton, Ontario. This expert team later developed computer programs for the naval tactical data command and control system (CCS) for the DDH-280-class ships; thus, the CCS system owes part of its existence to the hydrofoil project.

A variable depth sonar was designed and built for the FHE-400, with Canadian Westinghouse responsible for the electronics, and Fleet Industries Ltd. supplying the over-the-stern handling gear. Sales of this technology were later made to the Italian and Swedish navies.

The hull structure of HMCS *Bras d'Or* was designed to aircraft standards. By appropriate instrumentation of the hull for sea trials, the strengths and weaknesses of this technology vis-à-vis conventional ship design practices for hydrofoils were ascertained.

A number of other technologies developed during the hydrofoil project have not been directly applied elsewhere:

a. the use of maraging steel (an extremely high-strength steel) in the main foil structure;

b. the innovative design for the transmission of high power from the main engines through the narrow foil-struts to the screws;

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c. the use of aircraft electronics and preformed aircraft wiring harnesses; and

d. the design of the hydrofoil bridge in the manner of an aircraft cockpit.

Rigid adherence to a 60-knot foilborne performance requirement was the main offender in the evolution of the ship from a relatively cheap vessel, suitable for construction in large numbers, into a highly sophisticated design requiring construction techniques of the greatest refinement. Today, in the advanced marine vehicle field, the specification of maximum speed is tempered greatly by anticipated costs and by careful assessment of the related operational advantages.

The most visible achievement of the FHE-400 design was her speed of 63 knots which made *Bras d'Or* the world's fastest warship. A more meaningful accomplishment was the demonstration that a 200-ton hydrofoil could operate successfully in the open ocean, both foilborne and hullborne.

The use of aircraft technology in hydrofoil construction is a mixed blessing. It undoubtedly results in weight saving, but leads to a less robust ship that costs more. There are also expensive infrastructure and support costs over and above the support base required for conventional warships.

Undoubtedly, the most valuable contribution of FHE-400 has been the footing gained for Canada in the general field of advanced marine vehicle technology.

Pat Barnhouse is Chairman of the Canadian Naval Technical History Association.

joint project office model became accepted practice for all future projects.

Early in the design phase both the prime contractor and the Hydrofoil Project Office became confident in the viability of the hydrofoil and, in light of the increasing ASW threat, proposed expanding the project to include a weapon system. The Naval Board accepted the HPO recommendation, and one specific consequence of this decision was that a contract was awarded to Westinghouse for an action information system (AIS). Upon the demise of the hydrofoil project, the AIS became immediately available to the DDH-280 tribal-class destroyer project.

Once it was accepted that the hydrofoil would have a weapon system, it was also envisaged that FHE-400 would tow a variable depth sonar at 45 knots. Again, funding was made available for research in the ASW field.

The HPO recognized the need for research into the issue of habitability for the crew of 18, and funded extensive research at the Institute of Aviation Medicine in Toronto. The results of this habitability research became available to follow-on ship projects.

While FHE-400 had only one gas turbine, it was a first in the navy and provided an early training ground for future frigate programs.

As part of the HPO responsibility for support, the project's funding acquired a Syncrolift ship lift and transfer system. It was installed at the Halifax naval dockyard where it is now an invaluable asset for submarine support.

And finally, even today, FHE-400 *Bras d'*Or holds the record for being the fastest warship in the world. To those intrigued by this fascinating saga, I recommend John Boileau's book, *Fastest in the World*, and a visit to FHE-400 *Bras d'Or* at the Musée maritime Bernier at L'Islet, Québec.

Rolfe Monteith is a founding member of the Canadian Naval Technical History Association. He writes from his home near London, England.

Musée maritime du Québec (formerly Musée maritime Bernier) east of Québec City obtained HMCS *Bras d'Or* in 1983. *(DND Photo).*