BLA QUARTERLY DIGEST

Band, Lavis & Associates
A CDI Marine Group Company
900 Ritchie Highway
Severna Park, MD 21146

Volume 16 **June 2001**

FROM DAVE'S DESK

We continue to be excited by the quality and the significance of the products we deliver to our customers. We are, therefore, grateful that in most cases we are allowed to talk about them; well, at least to talk about them just a little. This newsletter is just one of several ways we do this. Another is the publication of conference papers. Already this year we have delivered eight technical papers. Six more are scheduled for delivery by the end of the year.

(continued on page 2)

USCG DEEPWATER SUPPORT
By Dan Bagnell, Director of Naval Architecture

One of the jobs that BLA has been tasked to perform, as part of its overall Deepwater support effort to the USCG's ELC, has been to evaluate the feasibility of multi-hull concepts for use in a high-endurance/national security cutter mission. This was a two-part effort. First, all different types of multi-hulls were identified and evaluated, qualitatively, against the performance requirements with the best candidate being selected for a more detailed evaluation. The multi-hulls evaluated ranged from traditional displacement-type catamarans to the more "high-tech" semi-SWATH and wave-piercing catamaran type hullforms. For the particular mission studied, a semi-SWATH hullform was determined to be the best candidate. The second part of the effort consisted of conducting a parametric assessment, using PASS (www.cdicorp.com/marine_bla.shtm, then click PASS), of lengths, hull length-beam ratios, and hull separations to identify the optimum size and configuration of the semi-SWATH hullform. Once the critical dimensions were identified, a more detailed run of PASS was made to develop all of the principal characteristics, lightship weight estimates, speed and powering information, and a seakeeping analysis. This information was then used to develop the basic design shown in the figure below and to verify the feasibility of the semi-SWATH concept for a USCG mission.

BLA Semi-SWATH Concept for USCG Deepwater Mission

T-2000 PATROL BOAT
By Brian Forstell, Director of Research & Development

The construction of the T-2000 combat air cushion vehicle is well under way. The photo below is now 3 months old and shows the craft flotation box and superstructure joined together and in an advanced state of completion at Aker Finnyards (www.af.akermar.com/index2.html, click on Benchmark, then click on Orderbook for T-2000 construction information). Band, Lavis & Associates had responsibility for the design of the machinery and skirt system plus stability, seakeeping, maneuvering and performance predictions for this craft under contract with Boeing.

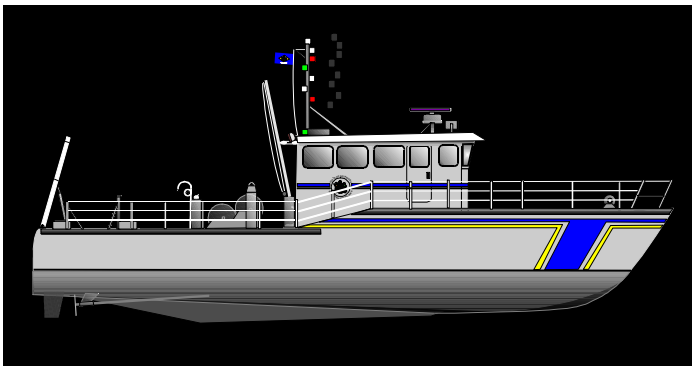
T-2000 Patrol Boat for Finnish Navy

As can be seen in the photo, the flotation box is manufactured from welded aluminum, whereas the superstructure is a high-tech composite construction. Current plans are for the T-2000 prototype to start builder's dockside trials in Finland late this summer with delivery to the Finnish Navy scheduled for mid-September of this year. Once delivered to the Navy, the T-2000 prototype will be put through a year-long series of craft performance and operational tests. BLA will be supporting the T-2000 testing with a team of test engineers starting later this summer.

(FROM DAVE'S DESK, continued from page 1)

Authors, so far, have included myself, Brian Forstell, Alan Becnel, John Purnell, John Allison, Sathish Balasubramanian, Bill Mish, Jeff Cullina, Mike Catelinet and Bob Wilson. The conferences at which papers have been presented include: the RINA International Marine Waterjet Propulsion III Conference in Gothenburg Sweden, the International Towing Tank Conference (ITTC) in Rome Italy, the 17th Fast Ferry Conference in New Orleans, the HIPER '01 Conference in Hamburg Germany, and the ASNE Day 2001 Conference in Alexandria VA. Publishing conference papers is a tradition at BLA, but has been increased this year because we have so much we wish to talk about. I, therefore, thank our clients for allowing us to do such exciting and meaningful work and for giving us the opportunity to tell others about it.

BLA ASSISTS DELAWARE FISH AND WILDLIFE DIVISION IN ACQUISITION OF RESEARCH VESSEL
By Dan Bagnell, Director of Naval Architecture



BLA Concept Design of Delaware State Research Vessel

The following Press Release was sent out in early May 2001:

"**Severna Park, Md.** – The State of Delaware, Department of Natural Resources and Environmental Control, Division of Fish and Wildlife has awarded a contract to build a 62-foot aluminum research vessel to Derecktor Shipyards of Mamaroneck, New York. The new research vessel will be used in the Delaware River, Delaware Bay and along the coastline to sample fish and shellfish populations.

Band, Lavis and Associates of Severna Park, Md., is assisting the State of Delaware during the acquisition process.

A recognized authority in high-performance and special-purpose vessels, Band, Lavis and Associates evaluated numerous options and configurations, developed concept designs, evaluated the effects of different requirements on cost and performance and prepared a design and build specification.

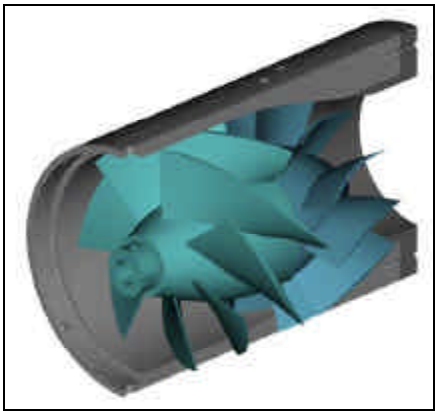
Band, Lavis and Associates then worked with the State to review and evaluate proposals as well as to assist in the final selection of the builder. During the construction, Band, Lavis and Associates will monitor construction progress for the State.

For further information contact the Business Development Office of Band, Lavis and Associates at 410-544-2800."

UNIVERSITY OF NEW ORLEANS WATERJET RESEARCH PROGRAM UPDATE
By Alan Becnel, Senior Engineer

The Gulf Coast Region Maritime Technology Center (GCRMTC), at the University of New Orleans, has awarded Band Lavis & Associates (BLA) the final year of the proposed three-year effort to develop performance prediction methods for marine waterjet propulsion systems that will account for interactions between the inlet and hull flows, and between the hull and the jet flow. NAVSEA Carderock Division, Marine Propulsors Company, and North American Marine Jet are subcontractors, and Ingalls Shipbuilding and Bird Johnson Company are industry collaborators on the project.

To date, a suite of software tools to design and analyze integrated waterjet systems has been developed and will be validated against model test results. These tests will include a 7.5-inch model waterjet pump to be tested in the 24-inch cavitation tunnel at David Taylor Model Basin in June and an 18-foot waterjet propelled model of the RV ATHENA in December. International Towing Tank Committee (ITTC) members, as part of the waterjet standardization test series, will also test these components.

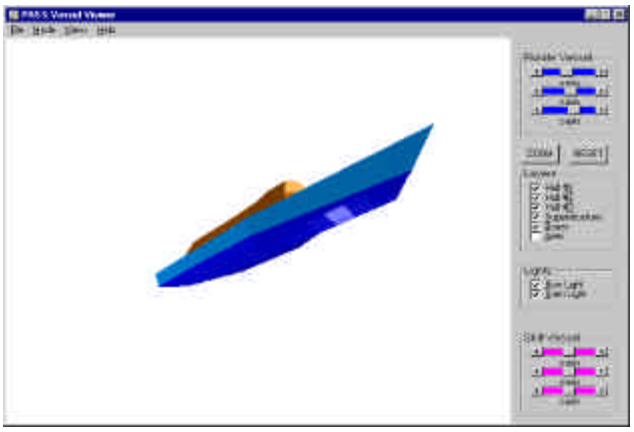


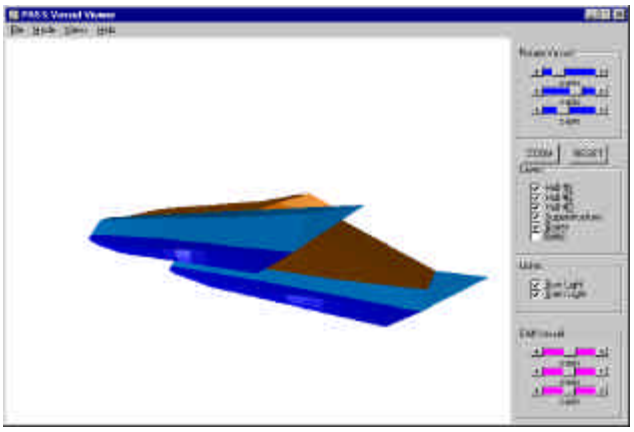
BLA 7.5-Inch Model Waterjet Pump Design

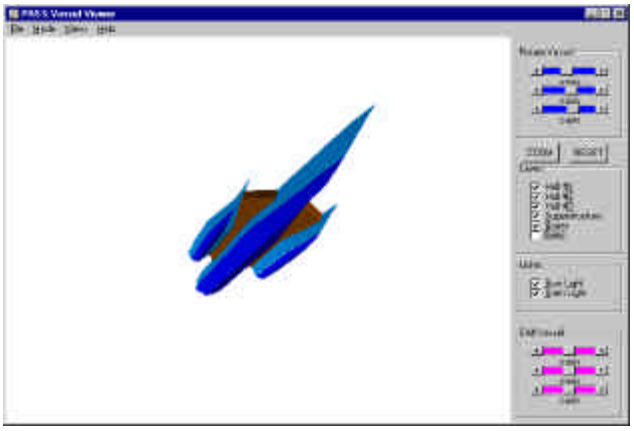
PASS UPGRADES
By Brian Forstell, Director of Research & Development

BLA's PASS program has undergone several improvements over the last several months. While most of the code changes are minor and were made to improve the fidelity of items such as the calculation of vessel CG and vessel acquisition and operating costs, a major upgrade in way of an entirely new graphics engine has been incorporated into recent releases. This new graphics engine eliminates the need for any form of node lock or separate license agreement and can be freely distributed by BLA. The new PASS graphics package is a work in progress with the latest release having improved wire frame visualization capability similar to the graphics package that is being replaced. The new edition to the graphics engine that we're very excited about gives the PASS user the ability to generate solid models of the PASS generated hullforms. Several examples of the new solids model output are shown below.

BLA plans to further expand the capabilities of the new graphics package to include more graphical output of the PASS synthesis engine results. A hearty well done to Mr. Jeff Cullina of BLA who has taken the time to learn and implement a new graphics development environment which has given us these enhanced capabilities.







Screen Views of PASS Ship Designs

PASS is a physics-based computer-aided design-synthesis model that permits simulation-based design for Displacement Monohulls, Planing Monohulls, Semi-Planing Monohulls, Catamarans, Trimarans, SWATH and Semi-SWATH. For each hullform type, the model permits whole-ship design trade-offs to be examined with respect to acquisition or operating cost and ship performance, including seakeeping. With support from ONR and technical oversight by NSWCCD and NAVSEA, the software has been developed with a strong focus on the use of physics-based algorithms. This has been achieved to ensure that extrapolations to new "out-of-the-box" designs will be accomplished with a higher degree of confidence than could be expected with methods that use empirical trends. The software integrates design synthesis engines that had been previously developed by BLA. Thus, the algorithms used have been extensively validated and, since 1978, used to support over 40 separate design projects.

The software is coded in C++, has an object-oriented architecture, and runs within a Windows environment on a standard PC. It simulates the traditional ship design spiral and, via numerous iterations, can converge on balanced solutions within seconds. The impact of varying over 400 inputs can be examined, usually one at a time. Inputs include requirements described within a comprehensive 8-segment characterization of a mission or route, and includes ship geometry design margins and standards, etc.

For each individual segment of the mission or route, the ship's speed, wave height, sea spectra, seaway modal period, ambient air temperature and percent of the time spent in the segment, can be specified to create a complete mission or route profile. All can then be varied to determine the overall impact on cost, for example. For all major systems, weights are calculated at the 3-digit level of detail and the ship's CG location determined for the continuous assessment of ship stability.

We are excited by the extreme power and versatility of this tool, which is being used every day in our office for not only design, but for assessing the impact of new technologies and mission requirements on naval and commercial ship designs.

ADDRESS CORRECTION REQUESTED

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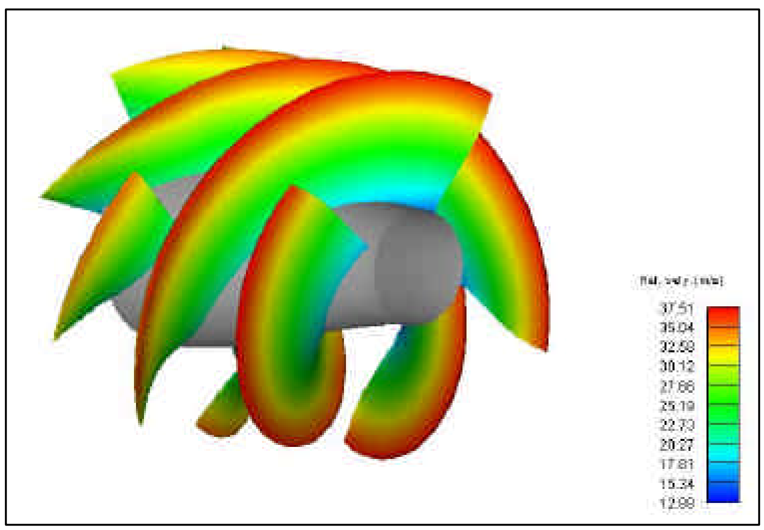
ENHANCED COMPUTATIONAL FLUID DYNAMICS (CFD) AT BLA

By Alan Becnel, Senior Engineer

BLA has acquired a license and has received training from the U.K company, Advanced Design Technology Inc., to use their 3-dimensional turbomachinery design software, TURBOdesign^{-1}, to assist in the design and optimization of marine waterjet propulsors. This detailed blade-row design tool will add to BLA's extensive marine waterjet-design capabilities by allowing 3-dimensional blade-row optimization of key factors such as blade-surface cavitation, secondary flow losses and overall hydraulic efficiency. This computer software can be used to design and optimize most types of turbomachinery and will find other applications at BLA such as in lift-fan design.



Relative Velocity Contours of a Waterjet Rotor with Splitter Blades

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