The NEWSLETTER

International Hydrofoil Society

P. O. Box 51, Cabin John MD 20818 USA

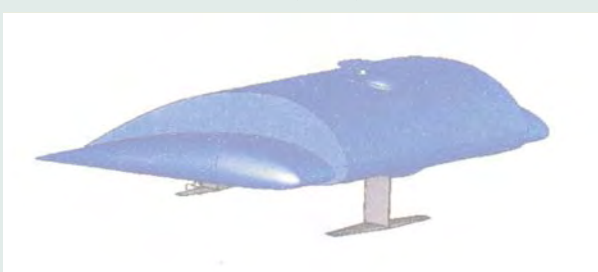
Editor: John R. Meyer | First Quarter 2007 | Sailing Editor: Martin Grimm

"SUB-CHAPTER T" WIGH PASSENGER HYDROFOIL

An Extract, by permission of ASNE, of a Paper presented at the ASNE High Speed High Performance Ships & Craft Symposium 2007 on January 24, 2007 in Annapolis, MD, by Michael Zauberman, Maritime Applied Physics Corporation, Dr. Jewel Barlow, University of Maryland, and Mark Rice, Maritime Applied Physics Corporation

Hydrofoils operating at relatively high speeds suffer from an aerodynamic drag penalty that can contribute as much as 15% of the overall drag. Under funding supplied by the State of Maryland and Maritime Applied Physics Corporation, a team of researchers looked at hull shapes that would reduce the aerodynamic drag while providing some aerodynamic lift. The resulting low-aspect-ratio, thick-wing-sections provided high lift coefficients due to their proximity to the sea surface. The paper described the Wing-In-Ground-Effect Hydrofoil (WIGH) concept and reviewed aerodynamic test results. The work indicated the net effect of these aerodynamic changes on the lift-to-drag ratios that can be achieved with a Sub-Chapter T passenger hydrofoil. "Sub-Chapter T" applies to small passenger vessels less than 100 gross tons that are allowed to carry more than 6 but less than 150 passengers.

The WIGH vehicle shown here is fundamentally a hydrofoil that experiences a limited amount of aerodynamic lift due to a thick hull that operates in proximity to the water surface. The vehicle operates at speeds that are potentially higher than those of a hydrofoil but not at the



Rendering of the WIGH Concept

See WIGH Passenger Hydrofoil, Page 3

YOUR 2007 DUES ARE DUE

IHS Membership options are: US$20 for 1 year, $38 for 2 years, and $54 for 3 years. Student membership is still only US$10. For payment of regular membership dues by credit card using PAYPAL, please go to the IHS Membership page at www.foils.org/member.htm and follow the instructions

INSIDE THIS ISSUE

PRESIDENT'S COLUMN

To All IHS Members

I regret to report the passing of another one of our fellow-Hydrofoilers, Capt. James Wilkins, of Annapolis, Maryland. Jim, at the age of 78, died of heart failure on Dec. 13, 2006. He served first as Vice President, and then as President of the International Hydrofoil Society from 1981 to 1984. We all in the IHS send our sympathies to his wife, Betsy, his two sons and many grandchildren. Please refer to JIM WILKINS REMEMBERED on page 8.

I want to remind all of you that IHS has instituted a new option for the Society's membership dues. Now you can sign up for $20 for 1 year, $38 for 2 years, and $54 for 3 years, thereby saving $6.00. You can do that right now by going to http://www.foils.org/member.htm#pay

You will note that the IHS has decided, at a prompt from one of our members "down under", to change the designation of the Newsletter issue from seasonal (no always appropriate on a global basis) to First Quarter, Second Quarter, etc. I hope that this meets with everyone's approval and satisfaction.

Those of us in the Washington D.C. area were fortunate to be able to attend a Joint Meeting of the IHS and the SNAME SD-5 Panel in January. The subject was: High Performance Boats & Craft for Expeditionary Patrol, Riverine Warfare & Harbor Security, by Jean-Michel Coughlin, PMS 325G, and Gary Weaver, NSWC CCD. I am pleased to announce that the presentation is now available on the IHS website. Scroll down to the section about Recent Presentations.

A reminder that the third AMV CD (CD#3) has been generated by the Society and is available for all to order thru the IHS website. As usual, the cost is a nominal $12 for IHS members and $15 for non-members.

I am encouraged to report the Society's continued growth with a total of 11 new members added to the IHS Membership roles just during the first two months of 2007. By the way, you can view the Membership List (a new one was generated as of the beginning of January) by logging onto the IHS website and put in the proper password. All IHS members have been informed of this password. If you have been missed, please contact the webmaster (webmaster@foils.org). It is advisable for all to check the information on the List. If it is incorrect, please send changes to: Steve Chorney: schorney@comcast.net

As your President and Newsletter Editor, I continue my plea for volunteers to provide articles that may be of interest to our members and readers. Please send material to me (jr8meyer@comcast.net) Bill Hockberger (w.hockberger @verizon.net) and Ken Spaulding (kbs3131@erols.com). We will be pleased to hear from you.

John R. Meyer, President

WELCOME NEW MEMBERS

Prakash Michael Bhimsingh - Prakash is owner of a Voskhod 2, built in 1989. He lives near Toronto, Ontario, Canada, and would like to hear from suppliers of parts for this vessel especially engine parts for Zvezda M401a diesel engine. Also he will entertain offers for chartering this vessel. It is fully operational and Canadian flagged. One can contact him at: sailcanada@hotmail. com

Steven Colliss – Steve started his career with Vosper Thornycroft (now VT Group plc UK) in 1982 in their graduate apprentice program. He stayed on, and has spent most of his career working within the shipbuilding and marine products side of the business. Steve is the general manager of VT Marine Products in Portsmouth, England, which is a sister-company to Maritime Dynamics. Steve's technical work has been in the design and manufacture of hydrodynamic lifting devices of various types applied to marine platform motion damping systems and lift systems. Steve has held various posts including design, business development, and general management, and he spent four years working in the USA as the engineering manager of Maritime Dynamics.

Captain Frank G. Horn - Captain Horn was the first hydrofoil Squadron Commodore to have six PHM hydrofoils under his wing. He, the Squadron personnel, and all of the ship's crews were eager to demonstrate the Squadron's ability to be a reliable, powerful element of Navy seapower wherever they were ordered to operate. As suggested by the

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WIGH PASSENGER HYDROFOIL
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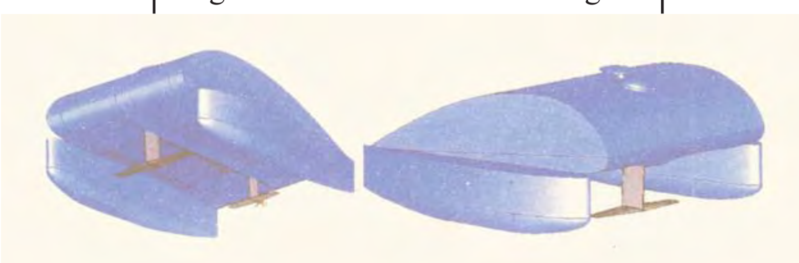
higher speeds of WIG vehicles. Unlike a WIG, the majority of the lift and control forces are from the WIGH's foils.

The objective of the WIGH design is to obtain aerodynamic lift from the in-air hull and minimizing the aerodynamic drag of the hull. The net effect is a significant (up to 10%) improvement in the Lift to Drag ratio of the vehicle.

The improved L/D ratio translates directly into a reduction in propulsion power with corresponding savings in fuel weight and engine weight. These changes, in turn, reduce the structural weight etc. Small changes in aerodynamic lift can have significant changes in the overall performance of the vehicle as they ripple through the design spiral.

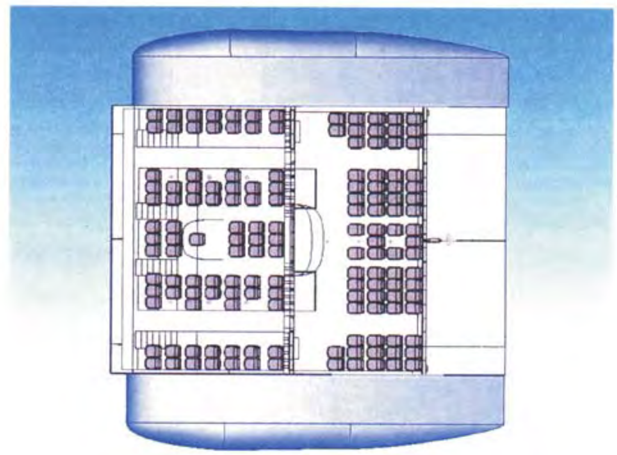
In the 2007 environment, fuel costs have become a dominant part of high speed ferry operating costs. Toward this end, any savings in fuel consumption will have a strong influence on the operating economics of high-speed ferries. While the hydrofoil developments of the 1970s may have been driven by the search for speed in waves, the current generation of work seeks lower fuel costs and improved operating economics.



Renderings Showing WIGH Sponsons in Lowered Position

The chosen hull shape had to both offer the desired aerodynamic characteristics as well as provide enough space for passengers, crew, and equipment. The Clark-Y section, having a flat lower surface, airfoil shape with a 25% thickness ratio, was chosen for its well-understood aerodynamics, its large cross section, a flat bottom side and simplicity of construction. The sponson airfoil cross section is a Clark-Y 12% thick section. The decrease in cross section was chosen to reduce weight, make deployment mechanically simpler, and provide for windows in the passenger compartment.

The hydrodynamic lifting system is a set of two T-foils with single struts. The section chosen for both foils was the YS-920 due to its good cavitation characteristics.



WIGH Internal Layout

The overall fully loaded weight of the vessel is 110,000 pounds. The forward foil carries approximately 70% of the weight with the aft foil carrying 30%. While a larger forward foil induces higher drag on the aft foil, the larger strut provides for better damage resistance in the event of a collision. The foils are equipped with a 25% chord length flap for roll, pitch, and heave control, and the struts are equipped with similar 25% chord rudders for yaw control.

The vessel's sponsons are electrically or hydraulically actuated in both the raised and lowered positions. In the raised position the winglets act as additional lift generators. While in the lowered position, the sponsons provide buoyancy to reduce the overall draft of the vessel. Internally, the vessel is split into two compartments. The forward compartment has stadium style seating (left facing forward in the illustration below) while the aft compartment has regular row seating. The pilot house is in the forward compartment so the viewing window is situated at the highest point of the hull.

The WIGH is only expected to operate in catamaran mode while in harbors with severe speed limits. The key design criteria for the sponson design will be the transition from catamaran mode to foilborne mode, which is expected to be achieved at speed of about 25 knots.

Due to the large disparity between the hydrodynamic and aerodynamic forces on the vessel it was determined that the best way to control the vehicle was through hydrodynamic controls. The control surface actuators are all contained inside the vessel

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WIGH Passenger Hydrofoil
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hull, eliminating the need for strut pods, further reducing drag. The flaps are controlled through a redundant computing environment with a high frequency bandwidth for short response times. The vessel maintains an average four to five foot height from the surface of the water and will cut through waves rather than track them.

The aerodynamic goals during the design of the WIGH were two fold. The first was to minimize the drag penalty of the hull and utilize the airflow around the hull to generate lift, which in turn would unload the foils. Unloading the hydrofoils allows for lower lift coefficients and smaller planform areas, and thus reduced hydrodynamic drag.

A thick section had to be chosen to accommodate passengers and machinery below deck. Extensive wind tunnel tests were carried out at the University of Maryland to provide baseline data for comparison with Computational Fluid Dynamics (CFD) calculations.

The work reported in the paper suggests that Wing In Ground Effect Hydrofoils can offer 20% reductions in fuel use per passenger mile relative to traditional hydrofoils and 50% reductions in fuel use per passenger mile relative to high-speed catamarans. These benefits can be achieved at high levels of passenger comfort and with traditional passenger vessel drivelines and components.

For additional information, please contact Mark Rice (mrice@map corp.com).

ROUND THE CLOCK OPERATIONS NEED RELIABLE SPARES

From *Ferry Technology,* February 2006

Mastering the demands of 200 daily sailings is Hong Kong operator TurboJet, which serves vital commuter links between Hong Kong and Macau, and has recently stressed how important effective maintenance and spare parts availability is to ensuring reliable operations.

With an average of a departure every 15 minutes, Hong Kong's Turbojet operations are one of the busiest in the world. The majority of Turbojet's 11 million annual passengers, 90 per cent, are frequent users of the company's services, and the other 10 per cent are group travelers. Of this average yearly total, 87 per cent are derived from its Hong Kong to Macau route.

TurboJet Has a Total 30 Passenger Vessels, Which Includes 13 Jetfoils

The company also runs services to Shenzhen and Macau and between Macau and Shenzhen. TurboJet Sea Express now also provides links from Hong Kong International Airport (HKIA) to Macau and Shenzhen. Turbojet and Turbojet Sea Express are the operating brands of Shun Tak - China Travel Ship Management Limited (STCT) company, which was established from the joint venture between Shun Tak Holdings Limited and China Travel International Investment Hong Kong Limited in July 1999.

The merger created one the largest fleet of high speed vessels in the Asia Pacific region, said the company. Turbojet has a total 30 passenger vessels comprising five vessel types and includes: 13 Jetfoils *(Flores, Madeira, Pico, Santa Maria, Sao Jorge, Urzela, Guia, Terceira, Funchal, Horta, Lilau, Cacilhas* and *Taipa);* one PS-30 *(Balsa);* two FoilCats *(Penha* and *Barca); 10* TriCats *(Universal Mk 2001* to *Universal Mk* 2010); and four FlyingCats *(Universal Mk I* to *Universal Mk IV).*

A team of over 400 engineers, technicians and staff manage the maintenance and repair of its entire fleet at the company's shipyard on Stonecutter's Island in Hong Kong.

"Reliability is one of our key priorities, "said Jen-Ning Wang, director and executive committee member Shun Tak - China Travel Ship Management Limited. "In 2005 we had a trip reliability of 99.6 per cent.

"To achieve this it is important that the vessel systems are simple and easy to maintain. We have three system design rules: that they use proven technology; spare parts availability; and technical capability. A good pre-

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NEED RELIABLE SPARES
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ventative maintenance program is also essential.

"The priorities for the design of our vessels are safety and their environmental impact; meeting the regulations of local authorities and the IMO; and their appeal to the customer, in terms of ride control, facilities, speed, reliability and convenience."

Turbojet's 27m Boeing-built jetfoils have a capacity to seat a total of 240 passengers. They operate of speeds up to 45 knots on the 24-hour service between Hong Kong to Macau, which takes around 55 minutes. The ferries' propulsive power is provided by two Rolls-Royce Allison 501-KF gas turbines, each driving a Rockwell Powerjet 20 waterjet though a Powerjet 20 gearbox.

The 28m PS-30 Jetfoils, built by Shanghai Simno Marine, can carry slightly more passengers, 260, and has the same propulsion outfit with a maximum speed of 45 knots. It serves the Hong Kong to Macau route.

The third vessel type to solely operate on this service is the 35M Fjellstrand-built FoilCats, which have the largest passenger capacity of all Turbojet's vessels at 45 knots. They are Powered by two General Electric LM500 gas turbines each driving Rolls-Royce Kamewa 80 SII/6 waterjets through Maag MPU-23 /G-50 gearboxes.

At 45m-long the 45-knot FBM Marine-built TriCats can carry up to 333 passengers. They serve the Hong Kong to Macau/Kowloon to Shenzen routes. They are powered by two Caterpillar Solar Taurus gas turbines, each driving a Rolls-Royce Kamewa 90511 waterjet through a Philadelphia 1000 gearbox. Turbojet's Kowloon to Shenzhen/Macau Shenzhen routes are served by the company's 40m Fjelistrand-built FlyingCats, which can carry up to 303 passengers. The service between Macau and Shenzhen usually takes approximately one hour and runs from 0945 to 1900 daily. They have a service speed of 35 knots.

NEW JET DESIGNS DELIVER FRESH THRUST TO MARKET

From Ferry Technology, December 2006

by Doug Woodyard

A compact high performance water- jet recently introduced by Wartsila is optimised for fast ferry propulsion and promises to foster further innovation in the design of such tonnage. Compared with established water- jets, the new Wartsila LJX unit reportedly offers a 25 per cent reduction in mounting flange diameter, a 10 per cent overall weight reduction and a 35 per cent increase in cavitation margin.

Waterjets remain the favored choice of propulsor for fast ferries, the latest designs promising lighter and more compact installations with higher efficiency and better control

A key merit cited is that an optimum number of waterjets can be selected for a given propulsion power requirement without dictating an excessive transom width.

In selecting waterjets for a high speed vessel project, Wartsila explains, the required power is generally distributed between multiple units to create an installation with lower weight, higher efficiency and (above all) lower costs than when using fewer, larger units. Multiple waterjets, however, impose a penalty in increased transom width, which is usually unacceptable in high speed vessels.

Furthermore, says Wartsila, waterjets hitherto available on the market are designed to cover all propulsive requirements for extremely high vessel speeds (up to more than 70 knots) and for very high powers on relatively small diameters.

LJX waterjets, on the other hand, are said to cut out the extremes in hydrodynamic design parameters and are based on a completely new design approach to create more compact units with heavily increased cavitation margins.

A mechanical design similar to the established Lips Jets' series from Wartsila is inherited by the LJX series, with all main parts of the stator and the steering assembly fabricated from stainless steel plates. This allows the designer to achieve minimum weight with maximum design flexibility.

Common steering/reversing and booster jets are thus possible, as well as jets for fast crash stop and reversing, jets with nozzle closing devices, and jets with inboard hydraulic systems. The oil-lubricated thrust bearing remains inboard in the jet room with a water-lubricated marine bearing supporting the shaft in the stator bowl; a design choice made for reasons of easy maintenance, access and reliability.

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NEW JET DESIGNS

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As an example of how the LJX waterjet will foster new fast vessel designs, Wartsila notes that the 36MW of propulsive power for a stabilised monohull ferry is typically developed by four diesel engines. Four waterjets are then the logical solution, but these rarely fit within the transom width.

A common compromise is to install two 9,000kW wing jets and a single 18MW central jet driven by a complex twin-input/single-output gearbox with two reduction ratios. An alternative arrangement - using an 18MW gas turbine instead of two central diesel engines - is unpopular because of the fuel consumption penalty.

Four LJX waterjets of equal size, however, will easily fit in the space normally taken by the three unequal-sized conventional jets because of the 25 per cent smaller diameter of the compact design, Wartsila asserts. The vessel operator also benefits from greater redundancy and lower logistics and maintenance costs resulting from a uniform propulsion installation in which all jets and gearboxes are identical and feature similar parts.

The first Wartsila LJX waterjets will be delivered to Incat's Hobart yard in Tasmania for driving two 112m-long wavepiercing vehicle/ passenger catamarans at speeds in excess of 40 knots. Each installation will feature four waterjets with 1, 5 00mm- diameter impellers and an inboard layout for the steering and reversing hydraulics.

Due for delivery next year to Japanese customers, the 1,500 dwt ferries will reportedly be the largest catamarans powered by diesel engines. Each will offer capacity for up to 1,000 passengers, over 800 lane-meters of trucks and 150 cars or a mix of heavy vehicles and cars.

Incat founder and chairman Robert Clifford believes that waterjets have gotten bigger and better over the years, and that they are much more efficient than propellers for speeds greater than 30 knots. "Weight and efficiency were the biggest factors in choosing these new units," he said.

Kamewa's successful SII series has long been the mainstay of the Rolls-Royce specialist's medium-to-large waterjet range, exceeding 2,000 units in service. Technical advances are incorporated in the new S3 design, initially available in specific frame sizes but planned for progressive expansion.

A weight reduction of around 10 per cent over the earlier series is reported along with increased compactness, in particular a reduction in the diameter of the transom flange that can be a critical point in catamarans with slender hulls. Thc center-to-center distance between two S3 jet units can be reduced by around 5 per cent compared with equivalent SII models.

Kamewa's New S3 Series is Headed into Production by the 63S3 Model

Life-cycle costs are also cut thanks to a revised bearing design yielding better running conditions for the pump seal and generally reduced wear and tear.

A new version of the waterjet control system, based on the Rolls-Royce common control platform, is said to simplify installation and commissioning since there are fewer components and less cabling.

The first size of S3-series jets, the 63S3, will enter service in a number of Overmarine's Mangusta 108 fast yachts, each 32.9m-long vessel being powered by twin 2,040kW MTU high speed diesel engines driving the waterjets for a speed of 37 knots.

Swedish designer Marine Jet Power (MJP) offers waterjets for input powers up to 10MW, claiming a high pump efficiency from a mixedflow pump and patented hub unit; a high reverse thrust, resulting from a patented bucket design; and durability from an all-duplex stainless steel construction and easily replaceable hub unit.

Using FRP as the material for the waterjet intake gives more flexibility for optimising its shape for the best performance and also fosters reduced maintenance, says MJP. A new impeller design is said to deliver more thrust and acceleration, and excellent results are reported from a new generation Vector Control System (VCS) for steering.

MJP's new DRB (double reverse bucket) waterjet introduced last year logged a debut in an AB 88-class yacht from Italy, the three 1,500kW shaftlines serving the triple MJP 450 DRB jets delivering speeds in excess of 60 knots.

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NEW JET DESIGNS
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Released initially as a 450 model, the DRB design will be offered in larger and smaller sizes as required by the market.

The jet unit features inboard hydraulics, a glassfibre intake and an all-stainless steel pump, steering and reversing unit for strength and corrosion resistance. A floating driveshaft enables the shaft to be extended up to the gearbox flange, making an intermediate shaft unnecessary.

Voith Turbo Marine, well known for its Voith Schneider Propeller program, has entered the waterjet market for the first time with a fully submerged/sub-surface design in which the water is processed linearly, passing straight through the jet. Commercial vessels with speeds of 24-40 knots are particularly targeted.

Voith's Wateriet is a Fully Submerged Sub-Surface Design

Conventional waterjets normally suck in water from under the hull and discharge above the waterline, and are also incorporated within the vessel's hull. The Voith system, however, is attached outside in two-or four-unit configurations.

ASNE SYMPOSIUM

An ASNE sponsored High Speed High Performance Ships & Craft Symposium was held on January 23-24, 2007 at the Sheraton Barcelo Hotel, Annapolis, MD.

Very shortly thereafter, the Proceedings were made available on the American Society of Naval Engineer's website. It is recommended that you log on to see the variety of papers and presentations available.

IHS was well represented during the Symposium in that Bill Hockberger (IHS Member) was moderator for "Advanced Hull Forms" session and Mark Bebar (IHS Member) was moderator for "JHSV, JHSS and LCS" session. There were several papers about hydrofoils or subjects related to them. An example is: "Subchapter T Passenger Hydrofoil" by Mark Rice (IHS Member) and Michael Zauberman (IHS Member) of Maritime Applied Physics Corporation, and Dr. Jewel Barlow of the University of Maryland. Also another IHS member gave a paper entitled: "Very Fast Planing Craft with Cavitation", by Konstantin Matveev (WSU). Other papers of interest were:
- 'WIG Design; Variable-Geometry Graduated Surface-Foil", by David L. Borman (International Maritime Flight Dynamics, Inc.).
- "Recent Developments in Lifting Body Ships and Small, High-Speed Hull Forms", by Todd J. Peltzer, PE (Navatek, Ltd.).
- "Improvement of Hydrofoil Ships Performances by Partial Cavitation" by Dr. Eduard Amromin and Dr. Svetlana Kovinskaya (Mechmath LLC).

Disclaimer

IHS chooses articles and photos for potential interest to IHS members, but does not endorse products or necessarily agree with the authors' opinions or claims.

FOND MEMORIES

Extracted, with permission, from *Fast Ferry International* December 2006

The December 1976 issue of *Hovering Craft & Hydrofoil* was a slim 32 page edition. With no news section, the contents were limited to an editorial, four articles and two pages of advertising.

The North American Director of *H&H,* Martyn Reeves, contributed 'Seattle to Victoria by Jetfoil' an article sub-titled 'First-hand Impressions of Georgian Gulf Cruises Ltd's New Passenger Hydrofoil Service'.

In fact, the service was a 46-day trial from September 17 until November 1. As Martyn Reeves explained, "On September 17, 1976, Georgian Gulf Cruises Ltd inaugurated the first continental United States Jetfoil service. The service was designed to determine the feasibility of a year-round operation linking Seattle and Victoria. This particular Jetfoil, the *Flying Princess,* ran a single round trip per day."

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Interested in hydrofoil history, pioneers, photographs? Visit the history and photo gallery pages of the IHS website.
http://www.foils.org

FOND MEMORIES

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The scheduled journey time for the 84 statute mile route was 1 hour 50 minutes in each direction, the fare was $16 one way or $30 for the round trip. On the morning trip to Victoria, Vancouver Island, a continental breakfast and coffee cost $1.50, a doughnut and coffee cost 50 cents. On afternoon trips, roast beef or ham and cheese sandwiches were available for $1.50.

A good selection of alcoholic spirits was also available for $1.50 each and soft drinks, milk or coffee cost 50 cents. There was also a smoking policy on board: "Cigarette smoking only please. No cigars or pipes". Describing the foilborne performance of *Flying Princess* at 43 knots, Martyn Reeves said, "The ride was absolutely smooth with no audible mechanical noise other than the windscreen wipers. Also, in the cockpit the engine noise was inaudible."

Retreating to the passenger areas, he reported, "One interesting point is that the life jacket forms part of the seat cushion, an unusual but practical innovation on the part of Boeing designers!

"The large windows of the Jetfoil provide excellent views for the passengers. On the top deck there is essentially very little sensation of speed and no indication that one is foilborne except for the incredibly smooth ride."

[Editor's Note: John Martyn Reeves was a Life Member of the IHS and well remembered by his fellow hydrofoilers. He unfortunately succumbed to a fatal heart attack several years ago.]

JIM WILKINS REMEMBERED

Retired Navy Capt. James Rudyard Wilkins Jr., 78, of Annapolis, died of heart failure Dec. 13 at Anne Arundel Medical Center.

Born Oct. 6, 1928, in Orient, N.Y., Capt. Wilkins graduated in 1950 from the US Naval Academy and received his bachelor and master of science degrees in naval architecture from the Webb Institute of Naval Architecture in Glen Cove, N.Y. He also earned a doctor of engineering degree in naval architecture from the University of California at Berkeley.

A naval officer until 1970, he served on the *USS Stribling* and *USS Cape Esperance*. He was the dry-docking officer at the Norfolk Naval Shipyard and subsequently was a design engineer at the Naval Bureau of Ships.

After teaching engineering at the Naval Academy, he was planning and production officer at the ship repair facility in Subic Bay, the Philippines. Capt. Wilkins became the program manager for the PHM NATO Hydrofoil Program and served as director of the Preliminary Design Division of Naval Ship Systems Command and Naval Sea Systems Command.

During the Vietnam War he served in the Philippines and was assigned several times for short duty in-country in Vietnam where he earned the Bronze Star. In Washington he was program manager of advanced warship designs, including design and construction of the world's first combatant hydrofoil warships, the PHMs.

Jim Wilkins was vice president of CDI Marine Inc. in Jacksonville, Fla., from 1977 to 1981, group vice president of engineering at the Avondale Shipyard in New Orleans from 1981 to 1988 and an engineering consultant and program manager for PRIME-MIDAS Inc. since 1988.

Capt. Wilkins served first as Vice President and then as President of the International Hydrofoil Society from 1981 to 1984.

Upon his military retirement he developed further expertise in world-class shipbuilding construction techniques and served until the day of his death to improve Navy shipbuilding technology and procedures.

In addition to the Bronze Star, he received the World War II Victory and Meritorious, China, Navy Occupation, National Defense, Korean and United Nations service medals. Capt. Wilkins was a charter member, first deacon and third elder of the Evangelical Presbyterian Church of Annapolis. Additionally he was a member of the Gideon Bible Society, the International Hydrofoil Society and the Society of Naval Architects and Marine Engineers. He enjoyed golf and solving jigsaw puzzles with his grandchildren.

Surviving are his wife, Betsy Meyer Wilkins, whom he married in 1950; two sons, James R. Wilkins III and David R. Wilkins, both of Crownsville; one daughter, Susan M. Fox of Annapolis; one brother, Bruce T. Wilkins of Solomons; and 10 grandchildren.

THE NIXON/VOLGA STORY

Suggested By Barney Black, IHS Member

A few weeks ago, Bill White sent an image of the Nixon Volga that he stumbled across on the internet and in turn Barney passed on the details of the relevant website. It was also covered it in an earlier IHS newsletter item.

In case you don't keep track of hydrofoil items posted on EBay, Garry Fry has just brought it to my attention that the Nixon Volga is now for sale. The current paint scheme is not as nice as the light blue it had then, and the best one seems to have been the overall white scheme it was originally delivered in shown below.

"Recordings from President Richard Nixon's secret White House tapes reveal that he and Chief of Staff H.R. Haldeman worked hard on a tricky exchange with Soviet Premier Brezhnev, gaining a ***Soviet hydrofoil*** *in exchange for an American-made Cadillac."*

Soviet leader Leonid Brezhnev, *left,* toasted United States President Richard Nixon

Soviet leader Leonid Brezhnev sent a hydrofoil boat Volga 70 to Richard Nixon in return for a Cadillac.

Soviet leader Leonid Brezhnev, toasted United States President Richard Nixon (1969-1974) in Moscow, marking the signing of the Strategic Arms Limitation Treaty on May 26, 1972.

Delivery of Nixon's Volga

From the Magazine, The Nation; Anchors Away; Posted Monday, Jun 19, 1972:

"Now for the fill-in-the-blank portion of our test. Pencils ready? If Richard Nixon gives Leonid Brezhnev a Cadillac, then the Soviet leader should give the President a, Well, what? What socialist product evokes the Communist system the way a Cadillac does U.S. capitalism? A personal, hand-controlled Sputnik? A collective farm?

"It is a taxing problem, and the Russians have given up trying to solve it. Headed Nixon's way by freighter is a gift from Moscow as capitalist as they come: a hydrofoil boat. If it arrives in time for the Republican Convention, Nixon will be able to rooster-tail through the waters of Biscayne Bay between his Florida home and the convention hall in true and glorious helmsman's style.

NEW OWNERSHIP FOR WIND - RIDER - RAVE

In the Autumn and Winter 2001 issues of the IHS Newsletter, we included a two part article on the WindRider Rave trimaran sailing hydrofoil. At that time, the sailboats were being produced by Wilderness Systems.

Don Maxwell (dmaxwell@windrider.com) has informed IHS that the WindRider line of trimaran sailboats has been taken over by WindRider LLC of Minnesota, USA of which he is a co-owner.

Parts and accessories for the Rave are available from the factory, at: www.windrider.com

A WindRider Rave Foilborne via WindRider Yacht Club Forum

WindRider LLC also has the hull molds and fixtures for the Rave and is contemplating making a new run of Raves in due time.

There are many WindRider Rave trimarans now sailing in the U.S. and around the world. Owners have made many improvements to the Rave control systems and information on these activities can be found on the owners' website at: www.windriderforum.com

L'HYDROPTÈRE – THE QUIET ACHIEVER

For several years already, it has been the intention of this editor to include a comprehensive item in the newsletter regarding the development of the large French sailing trimaran hydrofoil l'Hydroptère including the achievements of this boat and its crew.

Good images and considerable text were previously available on a non-official website, however, we were unable to make contact with the editor of that website at the time to gain permission to reproduce the material. Subsequently the unofficial website appears to have disappeared.

The good news is that the official website for l'Hydroptère (www.hydroptere.com) is now significantly more comprehensive than it was several years ago. There is undoubtedly growing worldwide interest in this stunning craft following its more recent achievements. IHS has been in contact with Marlène Colegrave from the l'Hydroptère team and we

Continued on Next Page

L'HYDROPTÈRE – THE QUIET ACHIEVER

(Continued from Previous Page)

hope to provide you with a more detailed article in the next edition stepping through the evolution of the craft including some of the trials and tribulations the team has faced along the way.

If you are not already aware of l'Hydroptère and are sufficiently intrigued, then visit the official website and read about the recent achievements yourself. Or simply view one of various video clips of the craft while underway foilborne. Particularly clear footage interchanging between views from onboard the craft and from an overhead helicopter edited with an evocative soundtrack can be found at the following link: http://www.hydroptere.com/accueil/images/videos/var/lang/FR/rub/19.html

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Various views of this fantastic sailing hydrofoil, l'Hydroptère.

WELCOME NEW MEMBERS
(Continued From Page 2)

Squadron's emblem, PHMs were designed "To Go In Harm's Way". It was during the time period of 1983 through 1984 that Captain Horn moved aggressively to prove and develop the Squadron's at-sea techniques and multi-ship tactics. Application of "big-ship" thinking and approaches had to be tested and validated for the PHMs, or else innovative approaches invented. Major emphasis was placed on "keep 'em sailing", or flying in the case of the PHMs. Captain Horn emphasized "operating successfully is the big payoff for all the Squadron's efforts in building, equipping, training, and maintaining this squadron of new ships. Captain Horn recently retired after a long and notable career in the US Navy.

William Richardson - Bill (William M.) Richardson graduated from MIT with a degree in Naval Architecture and Marine Engineering. Started in Hull Scientific Branch at Boston Naval Shipyard where one task was to find out why carrier deck edge elevators instead of stopping went to the bottom of the China Sea. At Mare Island Naval Shipyard developed the first non-linear optimization program for the design of any ship type, surface or submerged. After several years in the Computer Applications Branch where he was responsible for developing all programs for the naval architectural area, transferred to the David Taylor Model Basin. At DTMB first worked on controllers for hydrofoils. Spent several years dealing with SES structural loads and structural design criteria using probabilistic methods. Developed first practical level III computer program for estimating surface ship structural reliability. Recent work in uncertainty analysis and load estimation led to report "Lifetime Seaway Load Estimation (LSLE) Procedure with Examples".

Gary Steene – Garry has held various management positions in the Australian and US shipbuilding industries at yards that were focused on aluminum high-speed vessels since 1970. He joined Maritime Dynamics, Inc. in 1997. He provides applications engineering support for customers in Australia and Asia. There, Gary performs field engineering and commissioning support to vessels with lifting foils and interceptors.

Michael Zauberman – Michael received his BS and MS degree at Virginia Tech from the Aerospace and Ocean Engineering department in 2005. He began his engineering career as an engineering intern at Maritime Applied Physics Corporation. His internship work included design and installation of electric car heating systems, motion predictions of offboard ship crane systems, and combined heating and power systems for large building projects. After graduating he joined MAPC full time. His engineering work included designing a modern V/STOL seaplane as well as structural design of various boats. His most recent work is the conceptual and preliminary design of a Wing In Ground Effect Hydrofoil (WIGH) ferry. He recently co-authored a technical paper on this subject at an ASNE Symposium.(See article on Page 1.)

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NEW BENEFIT

IHS provides a free link from the IHS website to members' personal and/or corporate site. To request your link, contact William White, IHS Home Page Editor at webmaster@foils.org

The NEWSLETTER

International Hydrofoil Society
P. O. Box 51, Cabin John MD 20818 USA

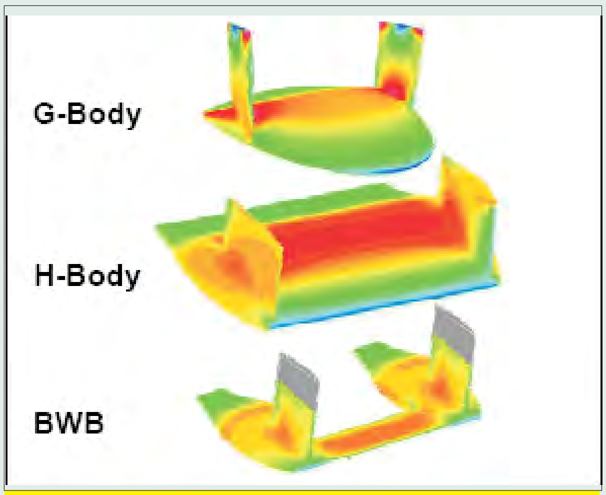
Editor: John R. Meyer | Second Quarter 2007 | Sailing Editor: Martin Grimm

Recent Developments in Lifting Body Ships and Small, High-Speed Hull Forms

An Extract, by permission of ASNE, of a Paper presented at the ASNE High Speed High Performance Ships & Craft Symposium 2007 on January 24, 2007 in Annapolis, MD, by Cdr. Todd J. Peltzer, USN (Ret.), P.E.

The trend towards small, fast, minimally-manned combatants challenges naval engineers to develop innovative systems that meet evolving requirements. Improvements in the performance of smaller craft are also needed for "brown water" applications. Recent efforts at Navatek, Ltd. address these challenges with technology developments in two areas: lifting body ships, and small, high-speed hull forms.

As an offshoot of lifting body ship research, Navatek has successfully demonstrated a high-efficiency propulsion pod, combining lifting body hydrodynamics, electric drive propulsion, and automated ride control, on a demonstration craft with dramatic improvements in performance and with an expected range of applicability from boats to ships. In the area of small, high-speed hull forms, Entrapment Tunnel Monohulls offer superior speed, payload, and ride quality.



Lifting Body Examples

See Lifting Body Ships, Page 3

YOUR 2007 DUES ARE DUE

IHS Membership options are: US$20 for 1 year, $38 for 2 years, and $54 for 3 years. Student membership is still only US$10. For payment of regular membership dues by credit card using PAYPAL, please go to the IHS Membership page at <http://www.foils.org/member.htm> and follow the instructions.

INSIDE THIS ISSUE

PRESIDENT'S COLUMN

To All IHS Members

I am encouraged to report the Society's continued growth with a total of 17 new members added to the IHS Membership roles just during the first half of 2007. By the way, you can view the Membership List (a new one was generated as of the beginning of January) by logging onto the IHS website and put in the proper password. All IHS members have been informed of this password. If you have been missed, please contact the webmaster (webmaster@foils.org). It is advisable for all to check the information on the List. If it is incorrect, please send changes to: Steve Chorney: schorney@comcast.net

I want to remind all of you that IHS has instituted a new option for the Society's membership dues. Now you can sign up for $20 for 1 year, $38 for 2 years, and $54 for 3 years, thereby saving $6.00. You can do that right now by going to http://www.foils.org/member.htm#pay

Those of us in the Washington D.C. area were fortunate to be able to attend a Joint Meeting of the IHS and the SNAME SD-5 Panel in April. The subject was "Research Challenges in High Speed Sealift Concepts", by Dr. Patrick Purtell of the Office of Naval Research.

Ken Spaulding is spearheading an IHS initiative. He has provided a brief write-up on the subject: "OUR HYDROFOIL HERITAGE. Readers may recall that, in 2004, your Society attempted to launch a hydrofoil museum exhibit. At that time we were not successful. This year your Board is putting this back on the front burner. We are determined to field an exhibit this time around. As our readers are aware, hydrofoils and their history should be interesting, if not actually fascinating, to maritime museum visitors. We have a lot of material; hundreds of photos, videos, DVDs and historical narratives. Models and actual "artifacts" such as foil sections, are available. We hope to produce a professionally narrated type DVD and possibly an animated tutorial. Oral narratives by veteran operators may be offered.

This is a vital part of our maritime heritage that has been overlooked. We are considering options which include a fixed, semi-permanent, exhibit and portable designs which can be circulated to different museums. We will seek donor support to design an exhibit and locate suitable sites in which to display it.

We solicit, herewith, our readers comments and recommendations. We think this is an important initiative. Let us know what YOU think. Please send comments to Ken Spaulding at kbs3131@erols.com"

As your President and Newsletter Editor, I continue my plea for volunteers to provide articles that may be of interest to our members and readers. Please send material to me at email: (jr8meyer@comcast.net), to Bill Hockberger at email (w.hockberger@verizon.net) and Ken Spaulding (kbs3131@erols.com). We will be pleased to hear from you.

John R. Meyer, President

WELCOME NEW MEMBERS

Timothy Duncan – Tim's interest in hydrofoils started in the 70's when his father built a proa with a foil on the outrigger. This was sailed (for a short burst) in Saldanha Bay (west coast of South Africa) at great speed. He has always been interested in sailing and has started looking into building another experimental craft. Tim has a business in Cape Town (Duncan Yachts) manufacturing a rowing scull, wooden furniture for yachts and is currently building an Antrim 40' trimaran (Jim Antrim is a designer from San Francisco) as well as a Schoinning 1480 Catamaran.

Alan Haywood - Alan has degrees in Applied Mathematics and Computer Science. He has worked predominantly in the marine and offshore industries specializing in simulation. He worked for five years at Curtin University in Perth where he was part of a team that developed a ride control system for Austal Ships. Since 1997 he has worked at Maritime Dynamics and in 1998 became manager of the simulation group. As well as running simulations, Alan develops the programs and assesses control system design. He is also responsible for trials analysis. Recently he has undertaken projects at MARIN where the MDI controllers have been used to control vessels in the seakeeping basin.

Joel Roberts – Joel graduated from Purdue University in 1965 as a Nav Ensign with a degree in electrical engineering. After two shipboard assignments as chief engineer, he was assigned as Officer in Charge of High Point (PCH-1). High Point

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LIFTING BODY SHIPS
(Continued From Page 1)

The challenges for designers in trading between speed, payload, seakeeping, and fuel efficiency are certainly not new, but the urgency for developing an achievable balance for Navy combatants is far greater than it has been historically. Additionally, the requirements that have been defined as essential demand ship and craft designs that are operational in restricted littoral environments as well as in the open ocean. An additional aspect of these requirements is that the designs must be extremely survivable and reliable. Thus, adaptation of commercial designs is not likely to meet all the needs.

Navatek's design approach for its lifting body ships focuses on blending three complementary technologies: 1. Innovative hull forms, 2. Lifting bodies, and 3. Active control systems that provide either flight control, ride enhancement, or both.

The goals of this approach are to produce ships and boats with improved motions across the entire operational speed range, from zero to maximum, with simultaneous improvements in powering efficiency. The methodology to meet these challenging goals includes extensive analytical and computer modeling work as well as significant at-sea testing using scale demonstration craft.

Lifting bodies. Lifting bodies are underwater appendages with cambered foil cross sections that generate dynamic lift at speed. They are characterized by substantial volume, large planform areas, and low lift coefficients. Shown on page 1 are three examples of Navatek-designed lifting bodies with struts. They are designated as the "G-Body," the "H-Body," and the blended wing body, or "BWB."

Hybrid lifting body ships. These are ship designs that combine a parent hull form (monohull or multi-hull) with lifting bodies. Shown here is the 65-ft, 50 LT (19.8 m, 50.8 ton) technology demonstrator *Midfoil*, an example of a hybrid lifting body ship; it combines a "G" type lifting body with a multi-hull parent.

***Midfoil* Hybrid Lifting Body Ship**

Variable Immersion A key aspect of lifting body configured ships is the ability to reduce the wetted surface area of the parent hull through a combination of buoyant and dynamic lift from the lifting bodies and control surfaces. This is referred to as variable immersion.

The potential benefits offered by innovative hull forms combined with lifting bodies and active control systems as integral components of a hybrid lifting body ship include:

- Improved seakindliness - the quality of *behaving comfortably* at sea. This is accomplished through low amplitude, low acceleration motions. Improved seakeeping, or the ability to maintain normal functions at sea is accomplished through reduced added resistance, reduced slamming, and improved course keeping.

- **Higher speed** - This is accomplished in part because the lifting body itself is designed to be a hydrodynamically efficient shape, and so has a higher lift-to-drag ratio than the parent hull. Reduced motions permit higher operating speeds in a seaway due to both passive damping mechanisms (large added mass and viscous effects) and an active ride control system.

- Higher payloads, since for a given parent hull lifting bodies provide added displacement and useable volume. An existing hull design retrofitted with lifting bodies will gain displacement compared to the original, and the volume in the lifting body can be used for fuel or propulsion equipment.

- An integrated design, in which the ratio of displacement in the parent hull to that in the lifting bodies is a design variable, can result in a smaller, shorter parent hull. This in turn will reduce the powering requirements and could also potentially result in a smaller structural weight fraction. The consequence of these effects is a larger payload fraction, which in turn translates to enhanced mission capabilities, extended range, or some combination of both.

The design space for lifting body ships is large, considering the number of possible combinations of par-

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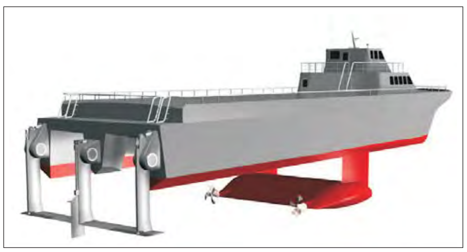
LIFTING BODY SHIPS
(Continued From Previous Page)

ent hulls and lifting body types and configurations.

Within this design space, a few specific configurations have been focused upon. They fall into two fairly broad categories designated as (1) Hybrid Small Waterplane Area Craft (HYSWAC), and (2) Hybrid Deep-V (HDV).



***Sea Flyer* HYSWAC Configuration**

The HYSWAC configuration can be characterized as a multi-hull parent combined with a single large lifting body near midships, and some means of providing supplementary dynamic lift to balance longitudinal moments. *Midfoil* is one example of the HYSWAC configuration. The 160-ft, 320 LT technology demonstrator, *Sea Flyer,* is a second example (see rendering). *Sea Flyer* employs an "H" type lifting body and a catamaran parent hull. During extensive at-sea testing, *Sea Flyer* demonstrated outstanding performance, recording a sustained top speed of 30+ knots; exhibiting minimal speed loss in seaway; and providing superb ride quality with exceptionally low accelerations.

The Hybrid Deep-V configuration uses, as the name suggests, a deep -vee monohull as the parent hull. This category is further subdivided by specific lifting body configurations as follows:

Single Lifting Body (SLB). Typically uses a planing deep-vee monohull as the parent. A single lifting body assembly is located at an appropriate position to balance longitudinal hydrodynamic moments.

Tandem Lifting Body (TLB). Typically uses a semi-planing deep -vee monohull as the parent. Two lifting body assemblies are installed in a tandem arrangement.

Bow Lifting Body (BLB). Typically uses a displacement deep vee monohull as the parent. A single lifting body is positioned at the bow, somewhat analogous to a bulbous bow. A second lifting device is required at the stern to balance longitudinal hydrodynamic moments.

One example of the three sub-categories of Hybrid Deep-V is shown here.

HDV-Single Lifting Body (HDV-SLB)

The SLB configuration is represented by a 35-foot (10.7 m) demonstrator designated HDV-35, the first of the hybrid deep-vee demonstrators.

The paper presented at the ASNE Symposium covered a broad range of technology development efforts in progress at Navatek to address the range of challenges presented by Navy and other operational concepts that require high performance ships and small craft.

MDI FLUSH WITH HIGH-SPEED FERRY MOTION CONTROL CONTRACTS

From Ferry Technology, February-March 2007

The past few months have seen U.S. ride control specialist VT Maritime Dynamics Inc. (MDI) flush with orders from the ferry industry, and in particular the fast craft market, where the company focuses much of its efforts.

MDI has recently supplied its active interceptor motion control system to the 38-knot high-speed catamaran *Iyanough,* which was recently delivered by Gladding-Hearn Shipbuilding to the Woods Hole, Martha's Vineyard and Nantucket Steamship Authority in Massachusetts. Other recent deliveries of interceptor systems include units for two Quicksilver monohulls built by North West Bay Ships in Australia, also for Galaxy Wave and Key West Express, catamarans built by Gulf Craft in Louisiana, USA.

Other orders for systems include: the supply of retractable T-foil and trim tab systems to INCAT for four of its large wave-piercing catamarans; combination T-foil and interceptor systems to Penguin Shipyards in Singapore for three Shipping Corporation of India 35m fast ferries; and interceptors to Aluminium Marine Australia for its 33m catamarans destined for the Great Barrier Reef and the Seychelles.

Joe Kubinec, general manager for Maritime Dynamics, claims that the company's design offers the high-speed craft operator an effective control system that has low weight, low

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MDI FLUSH WITH HIGH-SPEED FERRY MOTION CONTROL CONTRACTS
(Continued From Previous Page)

power and low cost, with no exposure to damage from floating objects or grounding. Constant trim optimization improves overall propulsive efficiency, which can help to save fuel or allow higher speed operation for a given power output. All of this may help to explain why application of this product has migrated to vessels as small as 11m long. In addition, the system is said to be easy to install or retrofit on most monohulls and catamarans; its simplicity can make trim and ride control affordable to many operators, and it can be used in conjunction with foils or fins.

MDI interceptors generate an increase in pressure on hull bottom plating directly ahead of the transom by intercepting the flow with a blade. At high speed, this blade has to extend only a few centimeters below the transom to generate pressure fields on the hull plating equivalent to the pressure produced by a trim tab, fin or foil. This makes it possible to use the interceptor - like a trim tab, fin or foil - to provide forces for optimizing running trim and damping pitch and roll motions.

The company has conducted a series of tests to characterize effectiveness of the motion interceptor on a 36-knot, 44m catamaran. More than 100 three-minute data points were recorded on 15 different tests days at service speed in a variety of sea states and headings, with wave heights ranging from 0.6m to 3.0m. Tests were conducted in the sequence interceptor on, interceptor off, interceptor on, to ensure any variability in wave height would be averaged out. Mr. Kubinec emphasized: “A large statistical sample shows that an active interceptor fitted onto a high-speed vessel can provide significant motion reduction in addition to trim optimization."

2006 DELIVERIES AND ORDERS

From *Fast Ferry International*, January-February 2007

Forty-eight fast ferries were delivered during 2006, the highest annual number since 49 were delivered in 2003. The 66 vessels on order on December 31 is the highest number since 2001’s 68 and the 114 vessels delivered and on order is the best combined total since 2002’s 122.

However, this does not tell the whole story. At the end of 2001, 30 of the vessels on order had capacities of more than 200 passengers and only one had a capacity of more than 200 cars. At the end of 2006 the corresponding figures are 39 and six respectively.

Both the number of vessels on order and the size of those vessels increased in 2006. One has to go back to 1997 to find a year in which both the number of vessels on order and the number of large vessels on order was greater than the current figures.

A fast ferry is regarded as a vessel capable of carrying at least 50 passengers, or an equivalent payload of passengers and cargo, at a minimum service speed of 25 knots. Medium speed and military versions of fast ferry designs are not included. As several companies build these, and other types of vessels, production activity at some yards is greater than a listing of just fast ferry contracts would suggest.

	Deliveries	Orders	Total
Catamarans	39	56	95
Hovercraft	1	1	2
Hydrofoils	3	1	4
Monohulls	4	2	6
Wavepiercing Catamarans	1	6	7
Totals	**48**	**66**	**114**
Passenger ferries			
50-99 seats	10	4	14
100-149 seats	17	7	24
150-199 seats	1	12	13
200-249 seats	4	7	11
250-299 seats	4	3	7
300-349 seats	5	2	7
350-399 seats	1	1	2
400-449 seats	1	15	16
450+ seats	1	-	1
Totals	**44**	**51**	**95**
Passenger/vehicle ferries			
5-49 cars	2	7	9
50-99 cars	1	2	3
100-149 cars	-	-	-
150-199 cars	1	-	1
200-249 cars	-	2	2
250-299 cars	-	2	2
300-349 cars	-	-	-
350-399 cars	-	-	-
400-449 cars	-	2	2
450+ cars	-	-	-
Totals	**4**	**15**	**19**

HYDROFOIL ENTHUSIAST

By Scott Smith, IHS Member

I am involved in a few hydrofoil projects, but they are personal, not business related. And like a lot of enthusiasts, progress is slow. Mostly I wanted to let IHS Members know that I do own a couple of fairly rare hy-

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HYDROFOIL ENTHUSIAST

(Continued From Previous Page)

drofoils that I would be more than happy to share pictures, videos, or design information on. I have had people visit to see and ride them, and would be willing to take pictures or measurements for anyone looking for specific information. I own the 1958 Grumman Hydrofoil that still shows on your page as being sold by Myrel Harner.

I also own 2 Dynafoils. I am building a machine shop onto my house for working on these projects, I hope to have the shop finished in about 3 months. The last time I took somebody for a ride in the Grumman, I snapped the right front foil mount. My first project when the shop is finished is to repair the mount, and fine tune the foil system to improve the handling of the vessel. Once it is running well I intend to take high definition videos of the Grumman running, as well as high-resolution photos.

I am currently re-working the exhaust and cooling system on the Dynafoil, and trying to make arrangements to install a 4-stroke engine in the second hull. I have a 16-foot aluminum bass boat that I plan to convert into a hydrofoil, mostly as a test-bed to experiment with different foil arrange- ments and control systems. When I am satisfied with the results, I will use that system to convert my 1957 Feathercraft into a hydrofoil runabout. Completion of the hydrofoil conversions are quite a bit off, but I mainly wanted to let you know that I am more than happy to share anything I can about them to anyone who asks. I do hope to make detailed scale models of the Dynafoil and Grumman, but that is probably 2 to 3 years away. I have sent DVDs to a few people with photos and what video I have on the hydrofoils, if you would like a copy I can send you one. [Scott's email is: boatswithwings @adelphia.net]

HIGH POINT UPDATE

By Terence Orme

I am the current owner and caretaker of PCH-1, High Point (HP). I would like to invite any and all interested in discussion or even to tour the ship. I obtained ownership in Nov. 05 and would like to inform the IHS of our plans for HIGH POINT and success up to this point. As far as PCH-1 is concerned my mission statement is this: I believe it is easier to rebuild than to re-engineer. My attempt is to do just that. I have read much on the IHS web site about people's different ideas for the application of a former U.S. NAVY Hydrofoil. Here's what I think. I will not turn HP into a motor yacht. It's a wicked machine made for speed, otherwise all that matters is the price of aluminum.

There's a host of things one could do with HP as an operating hydrofoil. I would be happy to discuss ideas at any time. Other than general organization and disposal of much non-HP related matter, our big success this last year was finding the original turbine exhaust ducts that were removed from the ship some years ago. They are in good condition and intact in their original assembly including the outer shields and mounting points from exhaust point of entry to the heat deflection tip (last configuration) out the stern. We discovered these at a scrap pile at Pier #3 in Astoria, Oregon, not far from the ship.

Also just recently discovered are four of the original six Vickers hydraulic pumps from the ship. All are designated PV 3. Three are rated for 3000 rpms at 3000 psi (Ships Service). The other is for one of the turbines. It's rating is 5000 rpms for 3000 psi. So we need one more of each, one 5000 rpm for the other turbine and another 3000 rpm for auxiliary power. Please inform me if anyone has ideas on how we could obtain these. They might be tricky to get because of FAA regulations. This summer we have some plans for repainting the outer surface areas of the ship. The deck and cabin house are much overdue. Damage control room will also be repainted this summer. We do the worst first! We have also obtained the interest of some key individuals, original manufactures and such. The first step is being hullborne.

Currently I am working on back engineering one of the Hydraulic pumps to conform with a new tier 2 status auxiliary generator set which will be provided from the original manufacturer Northern Lights. It will be a 4.5 John Deere Lugger motor with a 55 KW alternator. According to the Shipboard Qualification Manual (gratefully provided to me by John Meyer) this would be the reasonable replacement provided by the manufacture (N. Lights) today. This is the first step for hullborne activity. Currently, there is nothing to provide power for any ships systems.

I will keep the IHS informed of my progress any try to answer any questions other members may have about current status or future plans for HIGH POINT. Thanks to many members in IHS, Sumi Arima in particular, things are a little easier!

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RODRIQUEZ RHS 140 MODEL WAVE WAKE MEASUREMENTS IN SHALLOW WATER, AUSTRALIAN MARITIME COLLEGE (AMC), NOVEMBER 2006

Courtesy of Martin Grimm, IHS Member

In a IHS Newsletter article some years ago, we reported on wave wake measurements undertaken on a 1:20 scale model of a Rodriquez RHS-140 surface-piercing hydrofoil in October 2002.

Wave wake clearly apparent behind model of Rodriquez RHS 140 foilborne below towing rig, Australian Maritime College (AMC) Seakeeping and Manoeuvring Basin (photo courtesy AMC)

The tests were conducted by Mr. Gregor Macfarlane, Manager of the Ship Hydrodynamics Centre of the Australian Maritime College in Launceston, Tasmania, Australia. Those tests were part of the process of gathering experimental wave wake data for a range of hullforms to support Gregor's PhD research. The tests were the first on a hydrofoil model in what was already an extensive database of wave wake measurements which to that point had been limited to tests on monohulls and catamarans.

Since that time, Gregor has continued to gather wave wake model test data. The original database consisted of tests performed in deep water (relative to the model size and towing speed) however the database has now been extended to also consider wave wake in shallow water. He has re-tested a number of very different hull forms within the Australian Maritime College shallow water basin which has been built since the wave wake research was initiated. Gregor reports that up to now, he has been unable to assign the time to analyse all the test data with about 600+ runs on various models to be processed!

The hydrofoil model was originally built as a radio controlled scale model of the "Curl Curl" which once saw service on Sydney Harbour. For the tests, the model was stripped of its electrical and radio control gear and ballasted to the correct weight and centre of gravity.

RHS 140 model underway during wave wake measurements (photo courtesy AMC)

Disclaimer

IHS chooses articles and photos for potential interest to IHS members, but does not endorse products or necessarily agree with the authors' opinions or claims.

MAPC UPDATE

The year 2007 will be one of significant growth for Maritime Applied Physics Corporation (MAPC). The Company won new production contracts on the Littoral Combat Ship program and the DDG 1000 program, both with General Dynamics. Under these multi-ship contracts, MAPC will be supplying components for the propulsion, flight deck, and watercraft launch and recovery systems.

MAPC built two unmanned surface vessels under an ONR program. These vessels are now at the Combatant Craft Division of NSWCCD where they are undergoing mission systems integration work. Under IRAD funding, MAPC has incorporated lessons learned and is preparing for production contracts along with its partners.

MAPC has been working on a Subchapter-T hydrofoil ferry for Chesapeake Bay. A series of meetings have been held with the USCG Marine Safety Center, residents of the town of Rock Hall, members of the Annapolis ferry committee, several potential investors, and the Planning Department in the City of Baltimore. The Company remains optimistic that the wisdom of mass transit on water will become evident and this will lead to a high-speed passenger ferry system on Chesapeake Bay.

Continued on Page 12

Interested in hydrofoil history, pioneers, photographs? Visit the history and photo gallery pages of the IHS website. http://www.foils.org

SOME INTERESTING HISTORY

IHS received a letter recently from Chris Stacey, C.Eng., MRINA, MIMarEST.

A former colleague from my pre-IHS hydrofoil days recently wrote asking if the Mark Thornton (originator of the UKHS and then IHS) we knew and worked with was the former Commander of HMS Petard who found some Enigma code books in 1942. So I looked at your website which I have visited just once or twice previously, found that this was the same Mark (although we knew him well this was something we never knew about), and also looked at your most interesting archives on many of the hydrofoil projects.

It seems amiss that we have not furnished you with anything on this project which, thanks to Mark who partnered up with Christopher Hook to form a new private Company, I was involved with as Design Engineer for over 7 years. Hook was unfortunately not with us long because of a disagreement over design details but the partners commitment to this project was such that it had to continue. The finance was mostly from John Sloss and when the firm ultimately folded he lost everything and died, age around 40, quite soon afterwards.

So here is some outline material on the *Sea Ranger* (see drawing). I am enclosing a CD containing a most interesting video of the very last day of operating trials off Dartmouth when unfortunately I was ashore having been detailed to meet the Official Receiver. The next day, *Sea Ranger* was put ashore and broken up. Although *Sea Ranger* flew fairly successfully on maybe about 20 days of trials, separated by spells of intense activity for maintenance and modifications, no stills have survived as far as I know and the only proof this film which is quite good.

I then had to earn a living and pay off my debts as a joint guarantor of the firm, which I did and have done ever since based on the comprehensive knowledge of hydraulics I acquired during the construction and long commissioning process.

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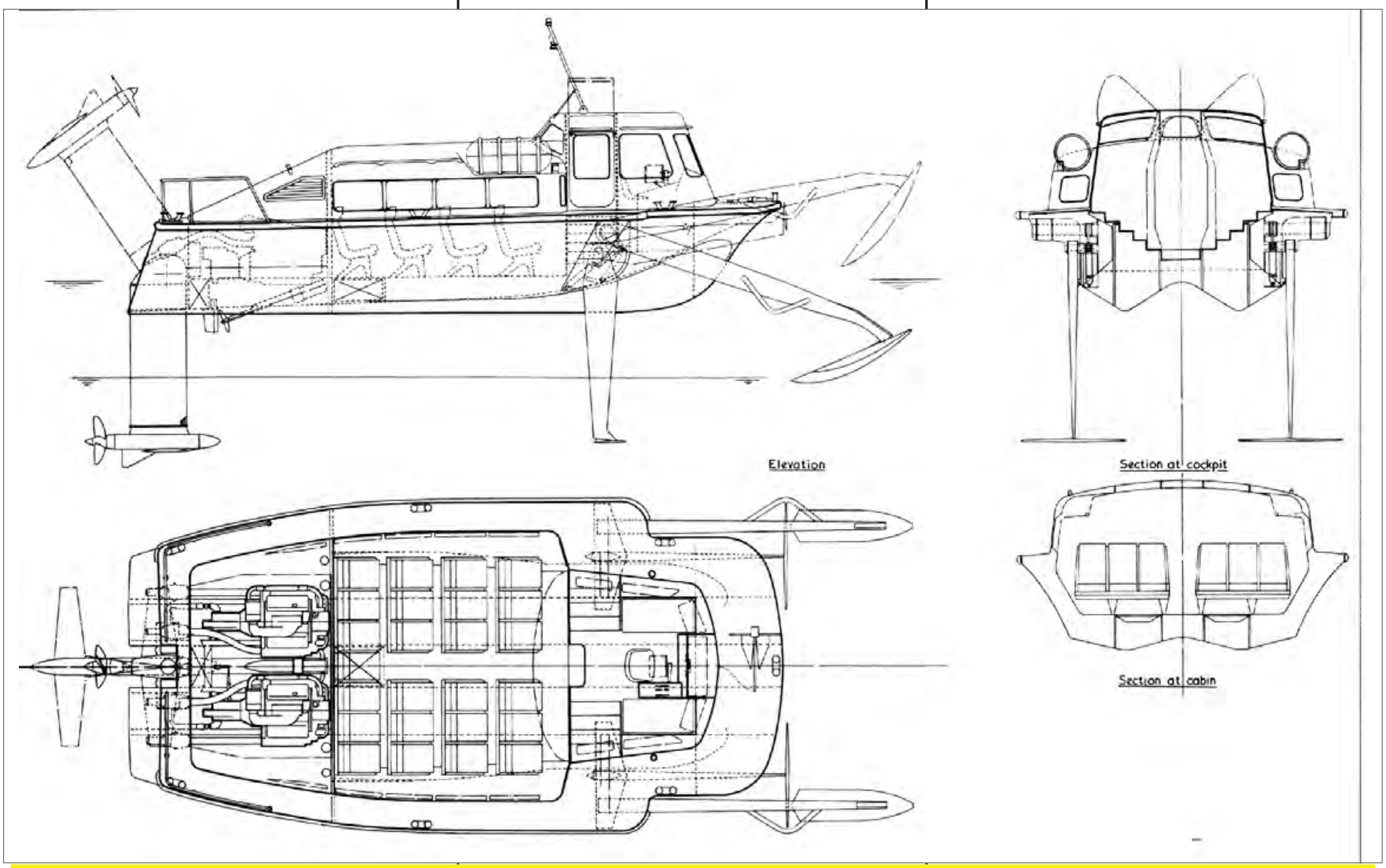

Drawing of Sea Ranger

SOME INTERESTING HISTORY (Continued from Previous Page)

SEA RANGER Submerged Foil Hydrofoil Characteristics:

Payload: 25 passengers
Hull length: 31 - 4"(10.30m)
Hull beam: 15' 6"(4.73 m)
Draft, foils retracted: 2' - 5" (0. 8m)
Draft, foils down: 8'- 9' (2.8 7 m)
Cruise speed: 35 knots
Take-off speed: 18/20 knots
Displacement: 9 tons
Engines: 2 -Detroit diesels BV-53

At the time of the trials, there was an 8mm film made, and later it was converted to PAL video, which in turn was then put on DVD quite recently.

Sea Ranger Launching

[Editor's Note: If anyone would like to borrow this DVD, please contact me at: jr8meyer@comcast.net]

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The error of youth is to believe that intelligence is a substitute for experience, while; the error of age is to believe that experience is a substitute for intelligence.

H. W. HAYNES WRITES

In looking at Mr. Craig Loomes Cruise Ship Trimaran on page 8 of the IHS Winter 2007 Newsletter, I thought you should take a look at M/V *Earthrace* (look her up on Google). She should be doing her global dash soon.

If the form is similar, it seems more cozy at 148 meters LOA than perhaps MN *Earthrace's* less comfortable (but purposeful) 25 meters LOA (snug). I truly wish Pete and Sheryl Bethune (and crew) a wonderful and successful global journey.

Shown here is one of a few photos of *Earthrace* that I took on a look see tour a few months back (last September 2006).

Earthrace at Pierside

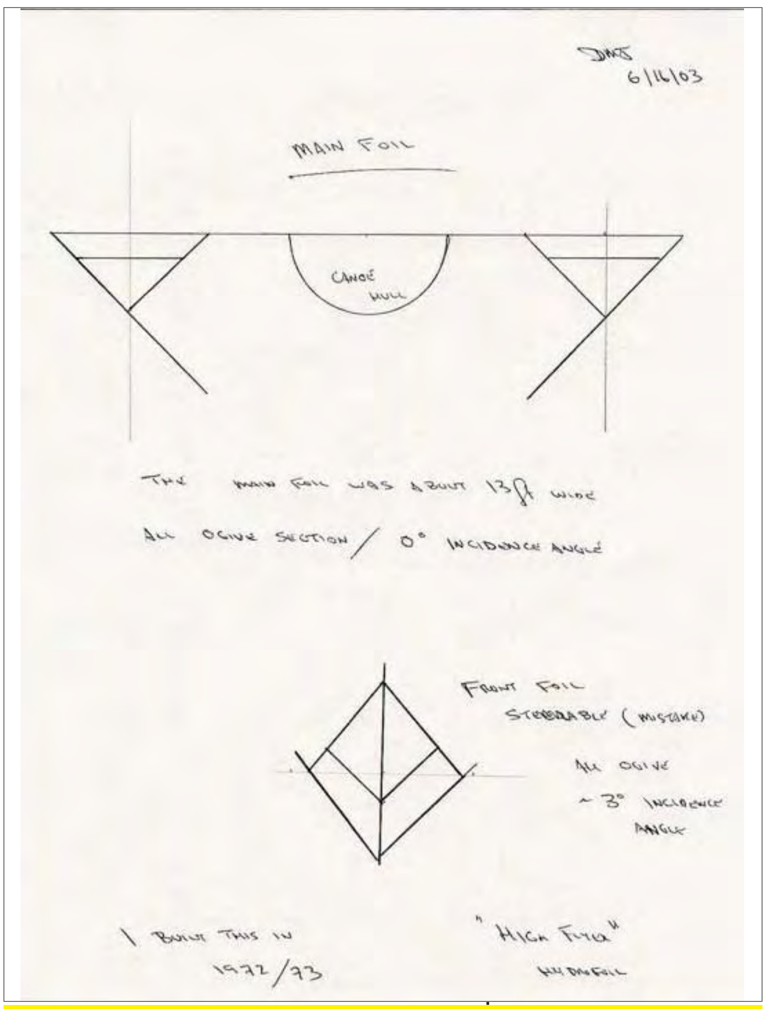
Editor's Note: Here is a shot from Barney Black showing Earthrace in action.

HYDROFOIL SAILING BACK IN THE 70'S

By David M. Jackson

I recently began getting interested in high speed sailing again after many years of only sailing lead bottomed boats (J24s) and Lasers etc. I thought your members would be interested in a crude hydrofoil I built in Grammar School in 1972 - 1973 after reading an article in 'Yachts and Yachting' magazine by James Grogono (designer of the 'Icarus' tornado catamaran based sailing hydrofoil). My craft was mostly built from scavenged materials (I was poor). It was tested on the River Severn in Shrewsbury UK and sailed on Clywedog Lake, Wales. I made the mistake of steering from the front, like an ice boat, believing at the time I could not afford the drag of rudders etc. Next time I will know differently. It towed to fully foilborne at less than 5 knots (the speed on the power boat didn't register). In the photos it was out-running a Boston Whaler at full throttle.

Sailing Hydrofoil "High Flyer" Foilborne Circa 1973



Sketch of the Design Concept

After the 4th sailing trial I broke off the front foil and crashed. It was never really put back together. I went off to be a Chemical Engineer. Now 30 or so years later it might well be time to build Mk 2.

[Ed Note: In the sketch attached with his message, David estimates that the span across the main foil assembly was about 13 feet and both the bow foil and main foils were of ogival section with the bow foil at 3 degrees incidence and main foils at zero degrees incidence. The configuration of the craft was similar to those adopted by Donald Nigg in the USA].

Sailing Hydrofoil "High Flyer" Foilborne Circa 1973

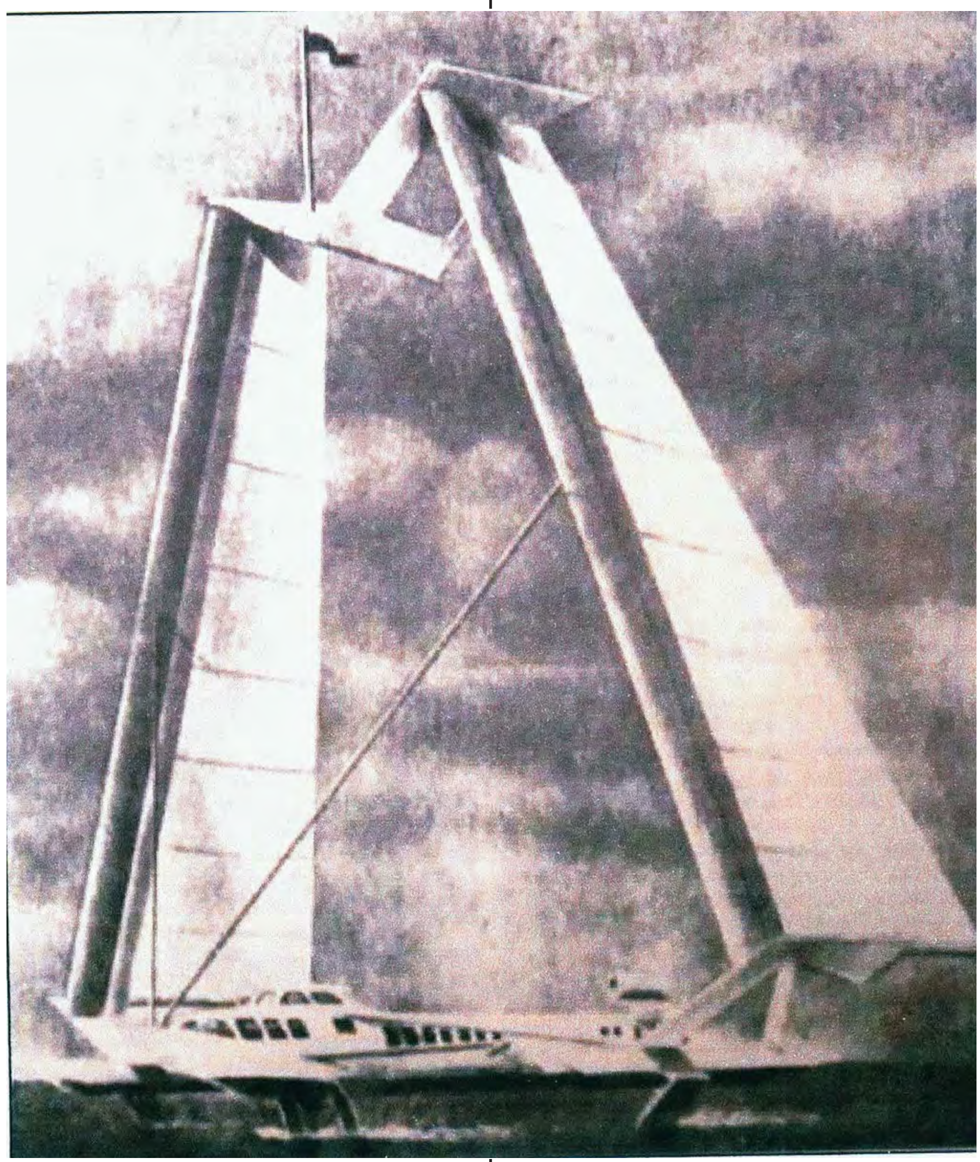
DREAMS OF THE PAST: SAILING HYDROFOIL PASSENGER FERRY

In the 1970's and 1980's, the annual "Jane's Surface Skimmers" and later "Jane's High-Speed Marine Craft and Air Cushion Vehicles" included not only details of powered hydrofoil designs and production craft, but also an assortment of research and personal sailing hydrofoils. In the 1985 and 1986 editions, and possibly others of that vintage, an intriguing sailing hydrofoil proposal from the Union of Soviet Socialist Republics (USSR) was also included.

The short entry described a design of the Leningrad Ship Design Centre based on a conversion of a Kometa passenger hydrofoil into a sailing trimaran. . The concept illustration included in the entry showed a Kometa style hull with two vertically-inclined sail wings with a total area of 1100 square metres. The item indicated experiments were being undertaken in Leningrad with rigid wing-type sails with slotted flaps.

The sail system was not intended to be an auxiliary source of propulsion but rather would constitute the main driving force. Estimated speed, with favorable winds, was projected to be up to 32 knots. The craft was intended to also be equipped with turbojet engines for generating the necessary thrust for take-off and foilborne operation and at least one of these is illustrated above the aft superstructure in the illustration. Length of the craft was proposed to be 39.5m (similar to the 35.1m for the standard Kometa), beam 50m (considerably more than the 11m of the Kometa) and displacement was estimated to be 58 tonnes (compared to a full load displacement of a standard Kometa of around 60 tonnes). Seats would be provided for 90 passengers (compared to between 100 and 120 for the Kometa depending on internal configuration).

Editors Note: Considering the scale of the sails and overall beam of the craft, the displacement estimate may have been optimistic. The weight saving through the likely removal of the pair of M401A V12 Diesels (reportedly 2 tonnes each) could not offset the structural weight of the rigid sails and support structure and the addition of turbojet engine(s). None the less, had such a proposal been shown to be feasible and progressed to production, the craft would certainly have caught the public imagination! If any reader knows more about this proposal and how far it may have progressed, we would be interested to hear from you such that we can report further in a future IHS Newsletter.



Hydrofoil Sailing Vessel Based on Kometa

WELCOME NEW MEMBERS
(Continued From Page 2)

completely captivated Mr. Roberts, and provided him the good fortune to continue his passion at NSRDC Carderock followed by Pegasus (PHM-1) as Executive Officer. Non-hydrofoil duties included Operations Officer on USS Texas (CGN-39). NROTC Executive Officer at Prairie View A&M University, and acquisition related duty at the Naval Material Command and the Naval Sea Systems Command. Along the way, Mr. Roberts enjoyed expanding his horizons at the Naval Destroyer School, the Naval War College, the DOD Comptroller School, and Prairie View A&M University where he earned an MBA. Joel Roberts retired from the Navy in 1988. Since that time he has been employed as a defense contractor with companies under contract to Navy Ship Acquisition Programs, primarily the Arleigh Burke class destroyer program. Joel is currently employed by BAE Systems as an Electronic Data Interchange (EDI) Systems Integration Engineer. He applies this technology to Earned Value Management of shipbuilding contract performance reporting.

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IHS OFFICERS 2006 - 2007

John Meyer	President
Mark Bebar	Vice President
George Jenkins	Treasurer
Ken Spaulding	Secretary

MAPC UPDATE
(Continued From Page 7)

MAPC is working for the Navy on a concept for aggregating multiple ship hulls to form a “Sea Train” that would reduce fuel use and/or increase speed for strategic sealift ships. These efforts will result in a tank test at the Naval Surface Warfare Center, Carderock Division (NSWCCD) this summer. Under a separate but related effort, we have worked for Bath Iron Works and ONR on a high-speed sealift ship hullform that recently completed tank testing at NSWCCD.

MAPC currently has 5 Phase II Small Business Innovation contracts with ONR and NAVSEA. Three of these involve components for advanced unmanned surface vessels, another involves an Unmanned Undersea Vehicle and the 5th is its work on aggregated ships. The Company is working hard to ensure that these efforts transition into production programs.

Under a subcontract with Structural Composites, MAPC completed the fabrication of three HY80 cores for the DDG51 twisted rudder programs. This is one of the five production contracts in place during 2007.

Under a contract with Crowley Marine, MAPC has been modifying the design of a very low ground pressure tundra truck that carries drilling supplies to the Alaska North Slope. This contract may result in an opportunity to construct a series of these unique vehicles. Among its other projects are solar photovoltaic and fresh water systems for Afghanistan.

MAPC’s vision is focused on the continued development of advanced marine vehicles. With the recent increases in fuel cost, the Company envisions a new emphasis on efficiency and will work in this direction through projects such as aggregated ships, hydrofoil ferries, and advanced machinery.

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NEW BENEFIT

IHS provides a free link from the IHS website to members’ personal and/or corporate site. To request your link, contact William White, IHS Home Page Editor at webmaster@foils.org

IHS BOARD OF DIRECTORS

2004-2007	2005-2008	2006-2009
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The NEWSLETTER

International Hydrofoil Society

P. O. Box 51, Cabin John MD 20818 USA

Editor: John R. Meyer | Third Quarter 2007 | Sailing Editor: Martin Grimm

CRAFT WILL THINK FOR THEMSELVES

Unmanned Surface Vehicles Will Venture Into Dangerous Waters

By Edward Lundquist, N86 Public Affairs

[Edward Lundquist is a retired Navy Captain. He works for Alion Science and Technology and supports the U.S. Navy's Surface Warfare Directorate.]

The U.S. Navy is looking at new ideas and solutions for unmanned surface vehicles (USVs) to protect ships as well as mission systems for the Littoral Combat Ship (LCS). Research is underway to give these systems more capability, including the ability to operate autonomously.

Unmanned systems offer many tactical advantages. USVs can perform difficult and dangerous extended missions in high sea states

High Speed Hydrofoil Version of the USV

See Unmanned Vehicles, Page 3

SUSTAINING MEMBERS

YOUR 2007 DUES ARE DUE

IHS Membership options are: US$20 for 1 year, $38 for 2 years, and $54 for 3 years. Student membership is still only US$10. For payment of regular membership dues by credit card using PAYPAL, please go to the IHS Membership page at <http://www. Foils.org/ member.htm> and follow the instructions.

INSIDE THIS ISSUE

PRESIDENT'S COLUMN

To All IHS Members

Again the Society continues to grow with a total of 19 new members added to the IHS Membership roles this year so far. By the way, you can view the Membership List (a new one was generated late July) by logging onto the IHS website and put in the proper password. All IHS members have been informed of this password. If you have been missed, please contact the webmaster (webmaster@foils.org). It is advisable for all to check the information on the List. If it is incorrect, please send changes to: Steve Chorney: schorney@comcast.net

I am pleased to report that Island Engineering has renewed its Sustaining Membership in the IHS. See an Update on their activities on page 12. In so doing the IHS has two new members: Stephanie Evans and Scott Henderson, both employees of Island Engineering.

Elections of the Board of Directors Class of 2007-2010 and Officers were held in June. The results are: the Class of 2007-2010 consists of Sumi Arima, John Meyer, Joel Roberts and William White. The Officers are: President, John Meyer; Vice President, Mark Bebar; Secretary, Ken Spaulding and Treasurer, George Jenkins.

Please see page 1 for the Society's membership dues. Now you can sign up for $20 for 1 year, $38 for 2 years, and $54 for 3 years, thereby saving $6.00.

In the previous newsletter I discussed current Board efforts to develop and field a hydrofoil museum exhibit being spearheaded by Ken Spaulding. I emphasized that hydrofoil history and technology have great potential for museum exposure to the public and that IHS has extensive files of historical texts, photos, videos and DVDs suitable for an exhibit. We were considering the possibility of both a permanent exhibit and one that was readily portable for circulation to various maritime museums.

As the Board worked this area over the last several months we reached a conclusion that our objectives would be best served by starting with a "virtual" exhibit on the web. It became clear that the "exposure" of such an exhibit would be dramatically greater than that of an exhibit in an individual museum. Accordingly we are now moving forward with plans to open a new hydrofoil website linked to the IHS site. We also find that implementation of this approach will be easier and less expensive than developing a polished museum display. We can start small with the materials in our possession and gradually expand the site.

The new site will also provide the basis for development of a museum exhibit at such time as we are able to identify an interested museum.

We will keep you posted on our progress but, in the meantime, we do need your inputs. Please send comments to Ken Spaulding at kbs3131 @erols.com

John Meyer, President

IHS SURVEY

The International Hydrofoil Society has developed a questionnaire to be used as a basis for a Survey of IHS Member skills and Experience.

The IHS, as a group, represents a source of hydrofoil experience and knowledge unparalleled in the world. Our charter directs us to provide channels to share this largesse with each other and to provide points of contact to non-members who desire to learn more about this exciting technology.

The board of directors (BOD) of the IHS has sought to facilitate this sharing by establishing a data base of the membership reflecting specific areas of expertise and interest of the individual members. When complete, this data base will be made available to the membership as a whole and in a more limited way, to non-members. Additionally, the data will be used by the BOD to prioritize ongoing and future projects.

At the same time the BOD would like to allow the general membership to participate more directly in the day-to-day governance of the Society. Specifically, the BOD would welcome the assistance of the general membership in staffing certain vital management areas such as website maintenance and financial management. In order to accomplish this, we must identify individuals who have the appropriate backgrounds and interests. This information will be included in the data base.

Continued on Page12

UNMANNED VEHICLES

(Continued From Page 1)

with low personnel risk and are not limited by human factors. USVs are ideally suited to patrol in shallow coastal waters where many threats lurk.

LCS is a modular focused mission warship that will address one of three missions: mine warfare, anti- submarine warfare and anti- surface warfare. The main combat capability resides in the offboard systems in those reconfigurable mission packages. Weapons and sensors are integrated into the mission packages, packed into modified 20-foot containers. LCS will be the first ship to employ unmanned vehicles on such a large scale.

"LCS has moved past exploring the "potential" of unmanned systems and is deploying them as the primary combat capability for a Navy warship," says Ken Montgomery of the LCS program office. "Our interests are shifting from capability demonstrations to production costs and capacity."

For example, the Naval Undersea Warfare Center in Newport, R.I. developed a remote control version of a rigid-hull inflatable boat (RHIB) called Spartan Scout for unmanned missions. Spartan Scout is an advanced concept technology demonstration (ACTD) used for evaluating concepts for LCS.

Bob Brizzolara of the Office of Naval Research's (ONR) Unmanned Sea Surface Vehicle (USSV) Program says ONR is looking at new purpose-built systems instead of converting existing manned boats into remote control drones. "Converted manned craft have limitations, such as sea keeping, speed, tow force, persistence and payload.

Of great interest is developing autonomous vehicle control so multiple vehicles can work together as a team and make independent tactical decisions. If a weapons release decision needs to be made, there will be a "man in the loop" with positive weapons control.

Other key areas being explored for USV improvement are communications and data links; fault monitoring; payload interface and navigation sensors.

Today's research and development efforts will result in improved endurance, speed and payload and will expand the USV's operational envelope.

Low- Speed, High Tow Force Version of the USV

ONR has designed and built a pair of very different aluminum USVs. One craft, the USSV-HTF, is designed to maximize high tow force (HTF). The other, USSV-HS, is optimized for high speed (HS). The 39-foot monohull USSV-HTF displaces 18,000 lbs, while the 36-foot USSV-HS is a hydrofoil displacing 20,000 lbs. **See picture on page 1. Also refer to the Autumn 2005 issue of the IHS NL feature article.** Both were designed to fit within the LCS weight and size limitations. Both are twin-diesel vessels and were built by Maritime Applied Physics Corp., of Baltimore. These craft are currently being evaluated in at-sea testing.

The Navy is working on developing autonomous vehicle control with dynamically planned navigation, on-board situational awareness and digital nautical charts, which have been corrected and fused with current data.

"Autonomy is the property that is introduced once the system begins making its own decisions," says Eric C. Hansen, head of the Autonomous Maritime Navigation (AMN) program with Naval Surface Warfare Center (NSWC) Carderock Division's Combatant Craft Department in Virginia Beach, Va. "Once you combine goals with on-board resources, and an accurate picture of the situation, the mission computer can use the data to choose the appropriate tactical behaviors to achieve the goals."

The AMN research is focusing on tying the on-board systems management to the navigation tools to allow rational and dynamic mission replanning when presented with complex changing situations, Hansen says.

The Navy is teaming with NASA's Jet Propulsion Laboratory (JPL) to de-

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UNMANNED VEHICLES
(Continued From Previous Page)

velop reasoning, situational awareness, dynamic path planning, and onboard resource management for USVs, drawing upon JPL's experience developing unmanned spacecraft, including the Mars Rovers.

"Significant autonomy has been developed and matured for the Mars Rovers and other planetary exploration spacecraft. Longer duration USVs and UUVs (unmanned undersea vehicles) have a very similar problem set as spacecraft," Hansen says. "A spacecraft and a ship at sea are quite similar."

ONR's USSV program is also looking at autonomous launch and recovery of USVs; more compact power sources and energy storage; lightweight structural materials, blast and ballistic protection; and cost, manufacturability and repairability.

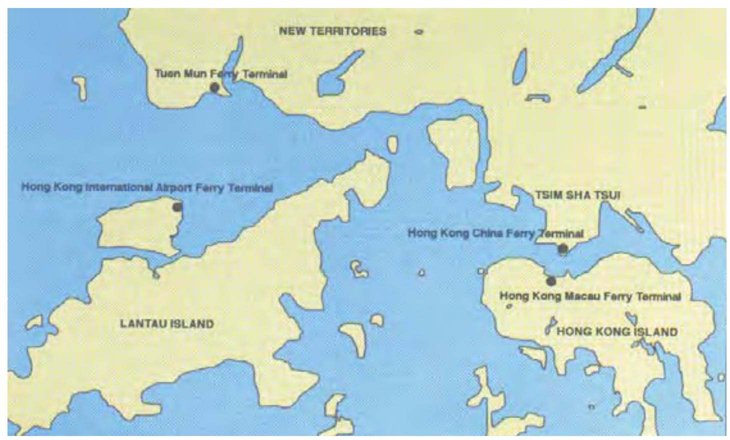
In addition to the LCS missions, USVs will be employed to patrol waters around moored ships. USVs can monitor waterborne traffic, and can investigate, question or warn suspicious craft to maintain a safety zone around a ship. USVs can provide force protection, conduct bottom surveys and seabed profiling, inspect battle damage and can be configured to carry a weapon. USVs can travel to an area of interest at high speed and then remain on station for a prolonged period of time operating at slower speeds. "Because they can be made tactically expendable and with a shallow draft, they can operate very close to shore, or in other high threat areas such as constricted river environments greatly reducing warfighter risk," Hansen says.

A RECORD YEAR FOR HONG KONG-MACAU TRAFFIC

From Fast Ferry International, April 2007

Figures released by the Hong Kong Marine Department confirm that a record number of 14,347,000 passengers traveled between Hong Kong's Macau and China ferry terminals and Macau during 2006. (See Table on page 5.) The figure represents an increase of 13.42% compared with 2005 while the number of services operated rose by less than 1.5 %.

When passengers traveling between Hong Kong Airport and Macau are added, total carryings between Hong Kong and Macau increase to 14,674,000 passengers. The number using the Airport route increased by 37.98% in 2006, although the total was still a relatively meager 327,000 passengers.



Macau services were operated from three terminals in Hong Kong and China, but from four following the opening of the Tuen Mun terminal in November 2006

The Department continues to detail passenger numbers for the individual terminals in Hong Kong but combines the number of services operated to and from each destination into a single figure. In 2006, 81,070 services were operated to or from Macau, an increase of only 1.46% over 2005.

The number of Jetfoil services between the Hong Kong Macau terminal and Macau actually fell marginally, by 2.39% to 36,760, while the number of catamaran services using the Macau, China and Airport terminals in Hong Kong increased by 4.90 % to 44,310.

Both passenger traffic and services operated are expected to increase again this year, with Venetian Marketing Services scheduled to introduce five Austal 48m catamarans by the end of 2007.

Beyond that, Venetian Marketing Services is due to introduce five more Austal 48m catamarans in 2008. New World First Ferry has ordered two Austal 47.5m catamarans for delivery in the second half of 2008 and another new operator, Hong Kong North West Express, has announced plans to introduce a fleet of catamarans between Hong Kong's Tuen Mun terminal and Macau.

Referring to the rise in traffic on the Macau routes in recent years, Tsang Yam Pui, the vice chairman of New World First Ferry (Macau), said last month that there has been "a remark-

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HONG KONG-MACAU
(Continued From Previous Page)

able increase in Macau tourist arrivals since the opening up of the gaming industry and the extension of the [Chinese Government's] Individual Visitor Scheme."

He continued, "With the forthcoming opening of mega resorts and entertainment facilities in Macau, First Ferry (Macau) expects there will be continuous growth in the demand for ferry services between Macau and Hong Kong."

Hong Kong-Macau passenger traffic 2006

	Passengers	Change	Services	Change	Average load factor To HK	Average load factor From HK
Hong Kong Macau & Hong Kong China terminals						
Catamarans	7,952,000	+23.44%	44,310*	+4.90%	42.4%	60.1%
Jetfoils	6,395,000	+3.01%	36,760*	-2.39%	71.4%	72.8%
Totals	14,347,000	+13.42%	81,070*	+1.46%		
Hong Kong Airport terminal						
Catamarans	327,000	+37.98%	-	-	47.7%	11.6%
Totals	14,674,000	+13.87%	81,070	+1.46%		

* Services using Hong Kong Macau, Hong Kong China and Hong Kong Airport terminals

Source: Hong Kong Marine Department

Mainland Routes

The closest Mainland China route to Macau, Hong Kong-Zhuhai, recorded similar percentage increases in traffic in 2006. Traffic rose by 12.12%, to 1,823,000 passengers, while the number of services operated increased by only 4.98% to 11,170.

Zhuhai High-Speed Passenger Ferry continues to operate from Hong Kong's Macau and China ferry terminals and, following the opening of the Tuen Mun terminal by Hong Kong North West Express in November 2006, the company has expanded its network to a third Hong Kong route, although the schedule on this is currently limited to just two return crossings each day.

However, Zhuhai High-Speed Passenger Ferry is optimistic about the new route, which is being operated in partnership with North West Express. The company has also indicated that it plans to order two or three new ferries in the next two years.

The only ferries currently on order for service on Hong Kong-Mainland China routes, two CMCS 33m catamarans being built by Wang Tak, are due to be introduced by Shenzhen Xunlong Shipping between Hong Kong and Shekou at the end of 2007.

Overall, activity on the Chinese routes using Hong Kong's Macau and China terminals was relatively unchanged in 2006. Total carryings fell by 0.93% to 6,479,000 passengers, while services to and from all four Hong Kong terminals increased by 0.84% to 70,850.

Airport Routes

All four routes between Hong Kong Airport and Mainland China cities recorded high percentage traffic increases, although this is not unexpected considering the relatively low number of passengers carried. Once again in 2006, with the exception of the Fuyong route, which serves Shenzhen Airport, passengers appear to have been more willing to travel to Hong Kong Airport by ferry than to travel from it by ferry.

HI TECH YACHTS

By Giorgio Fossati, IHS Member

We are a brand new shipyard aiming at manufacturing pleasure crafts (motor and sailing boats) with its own brand specialized in non-conventional boats and products, highly technological and innovative. A great deal of importance is also given to sailing comfort, top quality fittings, highly personalized, and to the design of the topside. In short: technology, quality, style, flexibility are the key elements.

Within this context our first project is to realize a motor boat to be mass-produced, introducing the concept of a quite standard open cruising boat having the ability to sail on hydrofoils.

This type of boat is often used to transport passengers on short/medium stretches and has also been developed in the military field, but so far it has never been used as a pleasure boat. We believe, in fact, that this type of boat requires a technological and engineering know-how, typical of the aircraft field and of the control systems technology, which was not and probably still today has not been technically developed in most shipyards.

We want to put on the market a motor boat which has the possibility of running on hydrofoil and achieving an adequate speed and comfort at sea in slight - moderate sea conditions (frequent during the Mediterranean summer season).

Our new HTY 42' hydrofoil open-cruiser is a fast family sport cruiser

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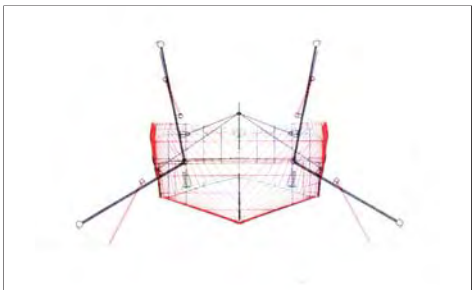
HI TECH YACHTS
(Continued From Previous Page)

plus has the ability of running on hydrofoils. An operational limitation of 1.2 m wave height and Beaufort 4 wind was fixed on our specification.

A characteristic of our system is that the foils can be totally folded thus getting rid of any problem during mooring, and allowing traditional type of sailing when necessary. The maximum draft also must not be excessive for shallow water use to ensure standard mooring and anchoring. See illustration.



HTY 42' Forward Foils Folding System Layout

These assumptions lead to the obvious choice that lift surfaces must be foldable and /or lifted when not in use. Following reflections on simplicity, cost and operating easiness we opted for a fully-submerged aft foil (not exceeding the maximum beam) and a fore surface-piercing V shaped foil arrangement, in way that folding device problem and cost is restricted to the forward foil. The adopted configuration is inherently stable.

The fore foils are foldable using a two hinges system, driven from two hydraulic rams. When hauled the two parts-foils on each side of the boat are folded-together in a vertical position and are not protruding out of the plan view sheer line of the boat. When unfolded the foils are on the contrary well beam-extended at side allowing good transverse stability, entirely carried out from the fore foils arrangement.

Our choice was in favour of a not too high foil load, say a relatively large foil area in order to have a calculated take-off speed of 17 knots. As to propulsion, we chose the water jet type, the only possible solution for this type of boat.

In brief, the technical data of the project are:

Length: 13.8 m (42')
Max Beam: 3.85 m
FL Displacement: 8500 Kg
Installed Power: 800 HP
Max Speed: 37 Knots

HTY 28' Prototype Boat - Fixed Foil Layout

To test our ideas, we chose to build a small prototype (28' overall length), which is being manufactured in a standard version (without foils), and we are going to start with all the test "in water", in order to measure its performance in this condition; then we will compare this performance with the one of the final model (with foils).

The foil surfaces on the 28' boat are fixed and not foldable, but geometry and parameters are comparable with the 42' version.

The foil load, on take-off, for the 28' is about 954 lb/ft^2 and we are thinking of using a similar one for the 42' boat. The weight of the empty 28' prototype is about 2000 kg at present including foils. We are going to test it in an empty and full load situation (3500 kg) and validate geometry and stability in both conditions.

To simplify and cut costs, we have used a 225 Hp outboard motor, mounted on a bracket adjustable in height with a system of hydraulic pistons controlled by a proportional valve. The foils of the prototype are of hollow welded steel construction, but the final boat will have foils in composite. The choice of steel for the study prototype was dictated from the easiness to modify foil shape, area and camber.

The prototype has been equipped with an advanced portable multi-functional data acquisition system which allows us to record and watch on a real time on a 17" monitor all the measured parameters: drag and lift forces on each foil (8 load cells), angular acceleration and speed on three axis (gyro-enhanced Attitude and Heading Reference System), speed and acceleration, engine RPM, and fuel consumption.

We have scheduled the Summer of 2007 for tests on the prototype and Spring 2008 for the launch and introduction to the public. Ing. Giorgio Fossati is General Manager of Hi Tech Yachts. For any further information contact Hi Tech Yachts (www.htyachts.com); info@htyachts.com

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ABSTRACT OF A PAPER: IMPROVED DESIGN FOR SEAKEEPING: SPECIFICATION ORIENTED DEVELOPMENTS

By William H. Buckley, IHS Member

As the result of long-term wave spectra measurements obtained by NOAA's National Data Buoy Center (NDBC), we are now able to supplement existing Sea State criteria with more precise and comprehensive seaway criteria for establishing ship seakeeping design requirements. These climatic wave spectra (CWS) have led to the identification of three distinct wave climates: Steep seas, Northern High Latitude seas, and Long Period seas. It is shown that values of existing Sea State criteria fall along the (intermediate) Northern High Latitude seas boundary.

The Steep seas and the Long Period seas boundaries form an inclusive parametric envelope in terms of significant wave height (H_{mo}) versus modal period (T_p) of the associated CWS. These have been determined at 1 meter class intervals of H_{mo}. Within the envelope ship mission operability requirements can be specified for procurement purposes. This envelope has been designated the Operability envelope.

In addition, a Survivability envelope has been established based upon measured extreme wave spectra.

In the case of both climatic and extreme wave spectra closed form approximations have been provided for use in analytical studies and for replication in seakeeping tank facilities at model scale.

The application of these seaway criteria to high performance craft design involves truncation of both the Operability and Survivability envelopes so as to correspond to the maximum specified Sea State values for the high performance craft involved. A suitable figure for doing this is provided.

It is anticipated that design for required mission capabilities in the Steep and Long Period seas wave climates will be important in the design of future high performance craft.

Note: Bill adds: This paper has been sent to SNAME for publication in Marine Technology, and has been in review by the Papers Committee for some time now. There is more to the paper than I have covered in this abstract. However, the seaway criteria I have covered, I suggest, is appropriate to consider at this point.

Briefly, the first principles approach which I have taken to the seakeeping design, test and validation of ships is modeled after aircraft practice with which I am familiar from my responsibilities in the Loads Group at Bell Aircraft. The Operability and Survivability envelopes are roughly equivalent to the V-n-h diagram for aircraft structural design. These require that potentially critical design conditions be specified for load and motion analyses, static tests and flight test demonstrations. Naval architecture has no equivalents at this time. My involvement with ship masters suggests that they know of such conditions but most naval architects may not.

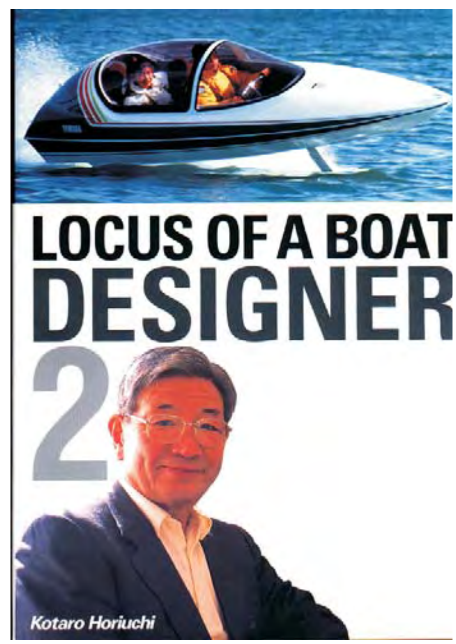
In any case, the seaway criteria I have developed is valid and stands on its own.

ABOUT "LOCUS OF A BOAT DESIGNER 2"

By Katoro Horiuchi, IHS Member

I have been very fortunate to be in an environment that afforded me the opportunities to design and develop new vehicles for land, sea and air. This book, "Locus of a Boat Designer 2", published by The Boat Association of Japan, is a record of my experiences, thoughts and emotions in the course of development of these vehicles. Of the 20 chapters in this book, six chapters are devoted to hydrofoil boats.

To achieve success, one has to surmount many difficulties. A failure might not give you another opportunity to develop a vehicle. Thus, the exciting experiences and the joy at



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ABOUT "LOCUS OF A BOAT DESIGNER 2"

(Continued From Previous Page)

whatever successes I had, were both unforgettable to me.

I have included a large number of figures, drawings and photographs in the book to explain technical concepts. I have also included a DVD with the book containing photographs and movie clips of many of the boats featured in the book. I hope that readers of the book will enjoy viewing the speed and maneuverability of hydrofoil boats and their motion in waves. The movie clips are in NTSC format and region-free, so they can be viewed on a TV in the USA too.

I will consider myself fortunate if I am able to fully convey my emotions and my experiences during the development of various kinds of vehicles to readers through this book.

NEW SURFACE DRIVE PROMISES SIGNIFICANT EFFICIENCY BOOST

By Dag Pike

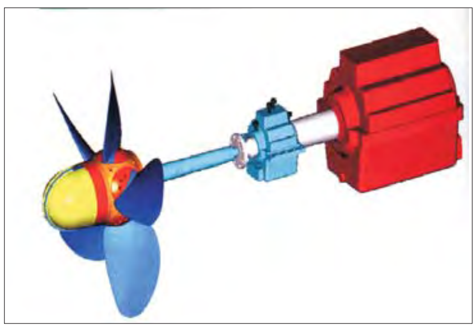
From Ferry Technology April/May 2007

By now, one would think that most of the various possible propulsion permutations would have been explored and tried, but yet one more new creation has appeared on the market. A prime potential attraction of the Vector Prop concept is that it can be used for both fast and slow craft and it is claimed to offer tremendous flexibility and efficiency increases.

German company AIR Technology has launched many innovative propulsion developments in the past, including the first large composite propellers. Today, AIR is part of the Voith Group and has focused its extensive expertise on evolving this new idea, which offers a combination of efficient performance and excellent manoeuvrability.

A novel surface drive system from Germany's AIR Technology is promising potential fuel savings of between 20 per cent and 40 per cent and can be used for both fast and slower craft

Vector Prop combines the benefits of surface propulsion, controllable pitch (CP) propellers and steering. It works by harnessing the efficiency and high-side thrust of a surface piercing propeller and, with computer control, offers attractions at both high and low speeds.



At the heart of this system are two or more CP surface propellers that are only submerged to the hub depth

At high speeds the ability to vary the pitch of the blades allows them to be optimised for the required speed. This pitch control also means that the craft will come onto the plane quickly and easily - unlike some earlier designs featuring fixed pitch (FP) surface propellers. The maker claims that amazing fuel savings of between 20 per cent and 40 per cent can be achieved, which, with the current price of fuel, means considerable economies.

At the heart of this technology are two or more CP surface propellers that are only submerged to the hub depth, even when the vessel is at rest. These large diameter propellers retain the high speed efficiency of the surface concept, but because the top blades are always clear of the water, even at low speeds, there is a strong 'paddle wheel' effect at low speeds or when stopped.

This effect is harnessed to generate a strong side thrust that can be used to turn the craft or to move it sideways. Because the propeller blades are controllable, this side thrust can be varied by increasing or decreasing pitch at low speed.

The Vector Prop system uses larger than normal diameter propellers, to allow a degree of draft flexibility. These propellers are mounted on fixed shafts that exit the hull at the bottom of the transom, with a fixed cowling above to contain spray. Alternatively, the propellers can exit the hull bottom further forward, with the hub just below the transom.

The larger diameter propellers - twice the size of conventional surface propellers for the same size of craft - are more efficient than smaller units, and the relatively low revolutions limit cavitation losses and reduce the risk of debris damage.

Continued on Next Page

Disclaimer

IHS chooses articles and photos for potential interest to IHS members, but does not endorse products or necessarily agree with the authors' opinions or claims.

NEW SURFACE DRIVE PROMISES SIGNIFICANT EFFICIENCY BOOST

The blades are made from high-strength composite materials that AIR has pioneered, and each blade can be quickly replaced without the need to docking the vessel. Also, the vessel's draft is comparable with that found when using existing propulsion systems.

The complete system is controlled by a computer, which adjusts the necessary engine speed, propeller pitch and the rotational direction of the propeller to match the throttle or joystick settings. A Vector Prop does not need rudders since the steering control at speed is achieved by small adjustments to the relative speeds of each propeller. At low speed the steering control is achieved mainly by pitch and revolution adjustments.

A Vector Prop Twin Screw Installation

A Vector Prop can easily be used with a twin, triple, or quadruple engine installation. Both model experiments in a test tank and full-scale tests on an 18m craft have confirmed the effectiveness of the design, and it is now being installed on several different types of commercial craft, including ferries, to test its long-term reliability.

ALISWATH MAKES PROGRESS

Extract from Ship and Boat International, July/August 2007.

The Italian shipyard Rodriquez Cantieri Navali and the class society Registro Italiano Navali (RINa) are making good progress on the development of the Aliswath environmentally-friendly high-speed ferry. A full scale prototype is presently under construction and is expected to undertake comprehensive sea trials this summer.

The Aliswath hybrid design combines the small wetted area [Ed: this should probably read "waterplane area"] of the SWATH concept with a hydrofoil system. The prototype is designed to carry 450 passengers and 60 cars at speeds of up to 28 knots, while reducing fuel consumption by 40% compared with existing designs. The design is also configured to reduce wash, emissions, and the risk of oil pollution.

According to Mario Dogliani of RINa, "The Aliswath design has presented us with some challenges, including dealing with the hull strength, wave loadings, and environmental aspects such as location of the fuel tanks, while ensuring the vessel also complies with IMO HSC Code. However, this is a step change for high-speed ferries and we are confident it will set a new benchmark for clean, green, and quick sea transportation".

Aliswath is the result of collaboration between Rodriquez and RINa with the support of the University of Genoa and the Krylov Institute of St Peterburg. The first Aliswath vessel is being built partly at Rodriquez' Pietra Ligure yard and partly at its Messina facility.

The aluminium hull will have an installed power of 6080kW from two stern pods, as well as twin diesel main engines mounted in the underslung torpedo hull and driving a high efficiency propeller. That compares with 9300kW required for the existing Rodriquez vessels of the same capacity and speed.

The stern pods system, developed by Rodriquez Marine Systems, features innovative pulling propellers which provide extra power, high manoeuvrability, and allow the vessel to continue operating at speeds of up to 11 knots in the event of a main engine failure.

Rendering of AliSwath from Winter 2006 IHS Newsletter

THE OUTER LIMITS OF SAILING

By Jim Flannery, Senior Writer Extracted from "Soundings" July 2007 reprinted with permission from Soundings Publications LLC.

[Ed Note: This is a follow-on article about *l'Hydroptère*, "The Quiet Achiever" promised in the First Quarter 2007 NL (pp 10 and 11). For further images of the craft, refer to that issue.]

A boat that skims across waves like a giant albatross has set two world speed records sailing - or flying - measured courses in the breezy North Atlantic off Lorient, France. *l'Hydroptère*, the 18-meter (60-foot) French sailing hydrofoiler, posted an average speed of 44.81 knots over 500 meters and 41.69 knots over a nautical mile on April 7 in 25-knot winds and flat seas. Those speeds eclipse the 10-year-old record of 42.12 knots set by the catamaran *Technique Advances* in Class D (sailboats with more than 300 square meters of sail) and boardsailor Bjorn Dunkerbeck's overall nautical-mile record of 41.14 knots set last year.

***l'Hydroptère* in Rough Water**

With the records ratified by the World Sailing Speed Record Council, *l'Hydroptère* is the world's fastest sailboat when measured over this distance. For 45-year-old Alain Thibault, *l'Hydroptère*'s indefatigable skipper, the records are the first fruits of a life's work.

Thibault has spent 20 years designing, building, breaking, redesigning and rebuilding hydrofoil trimarans that "fly" on three wing-like foils. "That which does not kill us makes us stronger," says the sailor of his two-decade quest to build a big hydrofoiler to sail across oceans at record speeds.

l'Hydroptère's two main foils, 6.5 meters each and angled inward, are mounted alongside pods at the end of carbon and titanium crossbeams on both sides of the main hull. A third, shorter inverted T-foil is aft and doubles as a rudder.

l'Hydroptère starts out sailing like a trimaran, but at about 12 knots it begins to lift out of the water on its foils and "flies" 7 to 10 feet above the surface with just the foils in the water. During trials in January it reached a speed of 47.2 knots, just shy of the overall 500-meter sailing speed record of 48.7 knots, set by Finian Maynard in April 2005 on a sailboard.

l'Hydroptère's crew members believe their hydrofoil can break 50 knots, the speed sailor's Everest. "I wouldn't be surprised if *l'Hydroptère* was the first to break the mythical 50-knot barrier," says Thibault confidently.

Thibault sails *l'Hydroptère* with a joystick, which adjusts fore-and-aft trim by changing the angle of a horizontal elevator on the aft foil. Lateral stability is achieved using ballast. He says the foils act like wings on an airplane. Moving through the water, they generate a difference in pressure between the wing's underside and topside. This difference in pressure translates into an upward force that lifts the boat out of the water so it flies. *l'Hydroptère* is able to achieve these high speeds because its hull isn't in the water creating drag.

Stung repeatedly by breakdowns over the years, Thibault believes *l'Hydroptère* has been strengthened and its design refined so that it finally is ready to challenge some distance records: the 24-hour speed mark and a trans-Atlantic. Yes, *l'Hydroptère* will be coming to New York - though when, Thibault isn't sure. "Since 1987 I have been preparing to cross oceans, and today the boat seems ready too," he says. He doesn't anticipate many more modifications. "It seems now to have both reliability and performance."

Major improvements include the carbon and titanium crossbeams, pods on the crossbeams for better stability in rough seas, and "shock absorbers" - nitrogen-filled pistons that cushion the vessel and keep the load on its foils below 28 tons. Fabricated at the

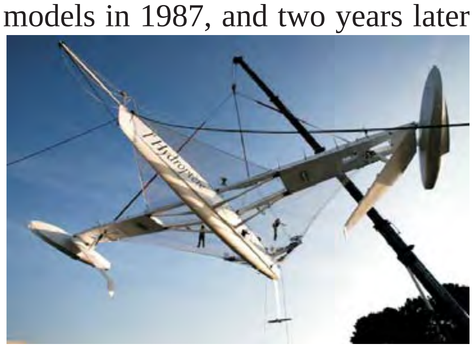
Continued on Next Page

THE OUTER LIMITS OF SAILING
(Continued From Previous Page)

French factory that builds the enormous Airbus aircraft, the pistons are similar to ones used to reduce load on the Airbus' wings. Thibault also is designing a "maxi" version of *l'Hydroptère* to challenge the round-the-world sailing speed record, and is building a 12-meter version of it as a research platform for developing more hydrofoils.

l'Hydroptère, derived from the Greek word meaning "marine wing", was decades in the making. From the beginning its designers envisioned a blue-water racer melding marine and aeronautical engineering. French sailing icon Eric Taberly started experimenting with foil catamaran models in 1976 with help from aeronautical engineer Alain de Bergh and Francois Lefaudeux, an engineer with the French Navy Shipyards. In 1985 Taberly passed the baton to Thibault who assembled a team of engineers and negotiated partnerships with the European Aeronautic Defence and Space Company, builder of the Airbus; shipbuilder ALSTOM and its Chantiers de l'Atlantique shipyard; and France's National Center for Space Research to carry the project forward.

The team developed two 1/15-scale models in 1987, and two years later



Underside View of l'Hydroptère

tested a 6-meter model that carried a pilot. In 1991 Thibault reported that the 6-meter boat was "unstable in roll, zigzagging, pitching, nothing works". With ongoing backing from Taberly, the team continued to trial and test the model, on the water and in tanks and wind tunnels, modifying it along the way. They launched the first full-scale prototype in 1994. It reached 39.7 knots on its first sail, but in 1995 a crossbeam broke on a run between Lorient and Belle-ile, France. In 1998 a metal fitting attaching the foil to the beam broke, causing the starboard foil to fall off and sending the design team back to the drawing boards - again. In 2002, after 10 English Channel crossings, Thibault thought *l'Hydroptère* was ready to race and joined Tracy Edwards' *Maiden II* in challenging the Round Britain and Ireland speed record. But again disaster struck when a beam broke. In the Summer of 2005 Thibault was ready to cross the Atlantic from Cadiz, France to San Salvador, Bahamas, but just a few days into the voyage *l'Hydroptère* damaged a connecting arm on one of the crossbeams in a collision with submerged debris. Then it was de-masted in a 75-knot tropical storm while docked in the Canary Islands for repairs. Back to the drawing board, Thibault rebuilt *l'Hydroptère* and re-launched her in the Summer of 2006 with a taller and more aerodynamic 28- meter carbon-fiber mast, more sail area (400 square meters), trampolines made of lightweight Spectra, a slightly longer boom, and pods on the crossbeams to help the boat sail though rough seas. His new goal: break the 500-meter and nautical-mile speed records, which he has now done.

Thibault says the technological challenge all along has been to build a light boat - about 6.5 tons - that's capable of withstanding enormous loads. The boat carries more than 100 sensors that measure loads and report to a computer, which sounds an alarm when loads become perilously high. Still, he says, the helmsman's expertise remains a decisive factor. " *l'Hydroptère* operates in a stable and smooth manner," he says. "The sensors that prevent it from going too far aren't enough, because in the end - faced with the unknown - it is the man who makes the final decision, not the electronics," he says. "We've made a few mistakes, but these are precisely what help us progress."

Undaunted, the Frenchman appears to be reaching his stride in designing a record-breaking, oceangoing hydro- foiler sailboat. In spring 2006 he announced a new partnership with Swiss investors Thierry and Adrien Lombard, Patrick Firmenich and Alexandre Schnieter to build the lab boat and the maxi hydrofoil, with technical help from the Federal Polytechnical University of Lausanne (Switzerland) and boatbuilder Bertrand Cardis' Decision S.A., which has built America's Cup boats. "Together we've dreamt up the ultimate boat, one that would go around the world in 40 days" he says. However, he says his team still is looking at the financial feasibility of that project.

After years of false starts, restarts and new starts, Thibault is confident that he is on the right track but not foolish enough to think that it will be all smooth sailing ahead. "*l'Hydroptère* is an avant-garde project very close in spirit, approach and difficulties to projects of the early days of aviation," he says.

IHS SURVEY
(Continued From Page 2)

Many IHS members have received a questionnaire, which we hope will be filled out to give us the information needed to construct the IHS Skills and Experience Data Base.

While we hope that the majority of the membership will allow unrestricted access to the information provided, we will limit that access to the society membership or to the BOD as any member directs.

Some of you may have received this message by e-mail with the appropriate instructions. The system has been set up so a member can return the information electronically. However, if one elects to fill out a hard copy of the questionnaire, it should be mail to:

IHS SURVEY

8803 Creek Wood Place NW
Canal Winchester, OH 43110

The Board of Directors thank all those who may have already responded by sending their Survey form to us, but we hope that all members will also eventually respond to the Board's request. If you have any questions or comments, please contact George Jenkins: georgejj@aol.com

IHS OFFICERS 2007 - 2008

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ISLAND ENGINEERING UPDATE

Island Engineering, Inc. (IEI) continues to support model test programs for some very exciting new technology- most recently the resurgence of the SES concept when we built the first Alion/Keck Technologies 'Sea Train' proof of concept model, tested via remote control at Piney Point. As some of you may recall, the 'Sea Train' was publicly unveiled this last year to the IHS by Dr. Pat Purtell. Working with Alion and Keck once again, we are currently engaged in building a more detailed and larger HSSL model that uses the Sea Train concept. This model will also use an Island Engineering 'Spectrum' ride control.

IEI is also on the Norwegian Company Umoe-Mandal team working on the T-Craft, and recently completed engineering work for canards and stabilizers on board the NOAA SWATH Coastal Mapping Vessel being built by VT Halter Marine.

Recently IEI supported the re- commissioning by Seaward Services of the USN LSC X-Craft 'Sea Fighter', and verified the operation of the Spectrum system and the SP-DAS. This IEI system is IEI's most advanced motion stabilization system, fielded jointly with Quantum Marine Engineering of Florida and has now been operating on the U.S. Navy's LSC(X) Sea Fighter for over two years. The system consists of two actively controlled titanium T-foils forward, two active transom interceptors, and two dynamic ActiveSkegs™ for yaw control. The vessel achieved a trial speed in excess of 50 Knots. System components are linked via an EMI resistant fiber optic LAN. System performance has been remarkable- we have recorded the highest gains ever for a control system of this type due to the cleanliness of the digital signal and low EMI of the fiber optic Ethernet system. The ActiveSkeg™ has proven to help reduce vessel course deviation by roughly a factor of 10 in stern quartering seas.

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NEW BENEFIT

IHS provides a free link from the IHS website to members' personal and/or corporate site. To request your link, contact William White, IHS Home Page Editor at webmaster@foils.org

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The NEWSLETTER

International Hydrofoil Society
P. O. Box 51, Cabin John MD 20818 USA

Editor: John R. Meyer | Fourth Quarter 2007 | Sailing Editor: Martin Grimm

FOIL ASSISTED CATAMARAN BUILT FOR CALIFORNIA OPERATOR

From Fast Ferry International, July-August 2007

Two United States companies new to the fast ferry industry, Geo Shipyard and Viking Fast Craft Solutions, have joined forces with South Africa's Foil Assisted Ship Technologies to deliver a 25m foil assisted catamaran, *Catalina Adventure,* to Pacific Adventure Cruises in Marina del Rey, California.

Geo Shipyard has been building aluminum commercial vessels, including medium speed catamaran ferries, at its yard in New Iberia, Louisiana, since 1979. Viking Fast Craft Solutions, which designed *Catalina Adventure,* was established in 2000 in Staunton, Illinois, to specialize in "the development, application and management of high speed vessel technology and design".

Geo Shipyard 25m Foil Assisted Catamaran *Catalina Adventure* During Trials

See Foil Assisted Cats, Page 3

SUSTAINING MEMBERS

YOUR 2008 DUES ARE DUE

IHS Membership options are: US$20 for 1 year, $38 for 2 years, and $54 for 3 years. Student membership is still only US$10. For payment of regular membership dues by credit card using PAYPAL, please go to the IHS Membership page at <http://www. Foils.org/ member.htm> and follow the instructions.

INSIDE THIS ISSUE

PRESIDENT'S COLUMN

To All IHS Members

I wish to report the Society's continued growth with a total of 20 new members added to the IHS Membership roles just during 2007. By the way, you can view the Membership List (a new one will be generated at the end of the year) by logging onto the IHS website and put in the proper password. All IHS members have been informed of this password. If you have been missed, please contact the webmaster (webmaster@ foils.org). It is advisable for all to check the information on the List. If it is incorrect, please send changes to: Steve Chorney: schorney @comcast.net

I want to remind all of you that your IHS dues payment for 2008 is due, and that the Society has recently instituted an option for membership dues. Now you can sign up for $20 for 1 year, $38 for 2 years, and $54 for 3 years, thereby saving $6.00. You can do that right now by going to http://www.foils.org/member.htm#pay

Those of us in the Washington D.C. area were fortunate to be able to attend a Joint Meeting of the IHS and the SNAME SD-5 Panel in October. The subject was "Response Boat–Medium (RB-M) Ramping Up the Coast Guard's Capabilities", by David M. Shepard, RB-M Project Officer, US Coast Guard Office of Boat Forces. You can download a copy of the presentation from the IHS website (www.foils.org) by scrolling down to "Library", click and go to "IHS Meeting Presentations/Papers".

As I mentioned before, Ken Spaulding is spear-heading an IHS initiative. He has provided a brief write-up on the subject: "OUR HYDROFOIL HERITAGE" in the 2nd quarter NL. In the third quarter Newsletter we mentioned that the Board reached a conclusion that our objectives would be best served by starting with a "virtual" exhibit on the web. A committee has been formed to manage this project. The "exposure" of such an exhibit would be dramatically greater than that of an exhibit in an individual museum. Also, implementation of this approach will be easier and less expensive than developing a polished museum display. Accordingly we are now moving forward with plans with a contractor, High Caliber Solutions, to open a new hydrofoil website linked to the IHS site. As we move along, we solicit, herewith, our readers comments and recommendations. We think this is an important initiative. Let us know what YOU think. Please send comments to Ken Spaulding at kbs3131@erols.com

As your President and Newsletter Editor, I continue my plea for volunteers to provide articles that may be of interest to our members and readers. Please send material to me (jr8meyer@comcast.net), Bill Hockberger (w.hockberger@ verizon.net) and Ken Spaulding (kbs3131@erols.com). We will be pleased to hear from you.

John R. Meyer, President

IHS SURVEY

By George Jenkins, IHS Member

In our last Newsletter, we advised you that your International Hydrofoil Society would be developing a data base reflecting the skills and experience of the membership.

Since that time your Board of Directors has circulated a survey form to be completed by every member to reflect his or her hydrofoil-related experience and interests. The quality of member response has been excellent and the data base is functional. Unfortunately, the number of the responses received is not yet adequate to reflect the full character of this society. Ideally we would like to have data from something approaching 100% of the active membership. At this time, despite a July initial mailing and five reminders, we have only 47% of the membership represented in the data base. If you have already responded to the survey please accept my thanks. If you have not, consider the following.

- The data base will be used for future BOD decisions regarding the structure and products of the society. Your response to this survey represents your interests and experience and thus constitutes your "votes" for the future of IHS.

- The data base will give the most direct and accurate source of communication with other members on matters of mutual interest. The more entries we have in the data base, the more complete searches for shared interests will be.

Continued on Page 12

FOIL ASSISTED CATS
(Continued From Page 1)

Viking Fast Craft Solutions has held licenses for Foil Assisted Ship Technologies (FASTec) HYSUCAT Hydrofoil Supported Catamaran and HYSUWAC Hydrofoil Supported Watercraft patents since the end of 2000. FASTec was established two years earlier by Prof Dr-Ing K.G Hoppe to develop foil assisted ships for the international market.

Catalina Adventure

Built to United States Coast Guard Subchapter T regulations, *Catalina Adventure* has two Caterpillar C32 diesels, rated at 1,045 kW at 2,100 rpm, powering five bladed fixed pitch propellers via ZF 2550 gearboxes. A Westmar 17 kw bow thruster is fitted in the starboard hull. The foil system consists of a fixed foil forward and an adjustable trim foil aft.

Geo Shipyard reports, "The hull and superstructure are constructed in aluminum and designed to American Bureau of Shipping's Guide for High Speed Craft. This is the ninth HYSUCAT design developed by Viking FCS in association with Prof Dr-Ing Hoppe.

"The hull form has been continually refined through the operational experience of each design. The foils on *Catalina Adventure,* supplied by Viking FCS, are made of high strength stainless steel and utilize the most efficient foil shapes developed for the HYSUCAT hull to date."

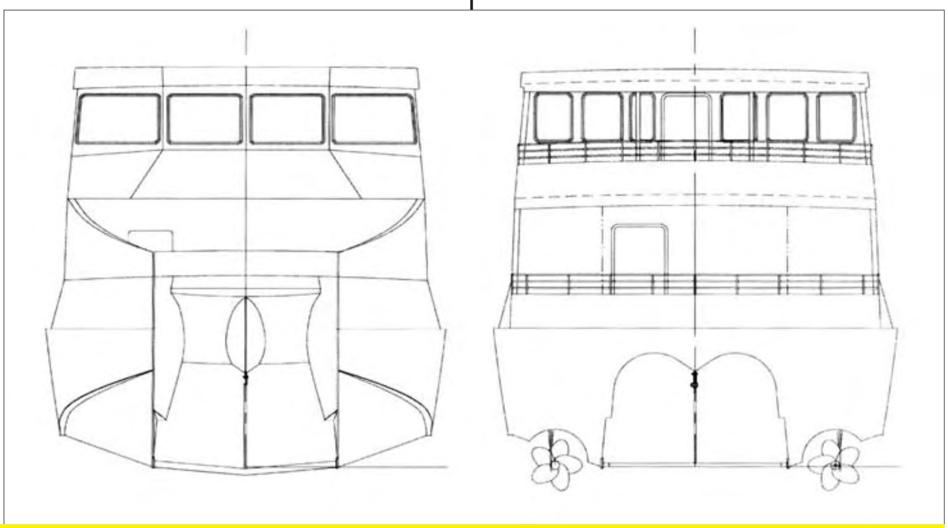
Although certified for 149 passengers, there is seating for 199 passengers on board. The main deck saloon is fitted out with 44 Arduous reclining seats in the forward section, cushioned bench seats around tables for 53 passengers, a refreshment kiosk forward and two toilets aft.

There is also padded seating for 21 passengers on the foredeck, described by the builder as "great for the whale watch season", and a padded bench across the stern for nine passengers.

Behind the wheelhouse on the upper deck, there is a VIP lounge for 15 people with a small bar and toilet, and cushioned external bench seating for 57 passengers.

"The vessel was sea trialed using 27,800 lbs [12.600 kg] of weight to simulate the passenger load and maintained 29.8 knots at 82% engine load. She goes from 7 knots idle speed to 29 knots in just over 30 seconds.

"Noise levels on the ferry are very comfortable over the full range of cruising speeds and top speed. Viking FCS with its associates performed an advanced noise and vibration analysis using a computer model of the hull and propulsion system. This analysis also utilized data measured on past foil supported catamaran vessels and defined the most effective noise treatment options. The noise level predictions were not exceeded during trials.



***Catalina Adventure* Has A Full Width Fixed Foil Forward And An Adjustable Trim Foil Aft**

"The owner sailed the vessel from New Iberia, Louisiana, to Fort Lauderdale, Florida, to have it transported by ship to its destination in California. When asked how the transit across the Gulf of Mexico went, he said the seas were 5-7 ft

Local residents and tourists using Catalina Island ferries tend to travel with a lot of luggage and *Catalina Adventure* is fitted with a cargo handling system and storage space for a total of eight pallets weighing up to 450 kg each in the port and starboard hulls.

Before delivery, Geo Shipyard says,

Continued on Next Page

FOIL ASSISTED CATS
(Continued From Previous Page)

[1.5m-2.1m], she had an extremely pleasant ride and the crew did not have to slow down."

Pacific Adventure Cruises

Catalina Adventure is Pacific Adventure Cruises' first fast ferry. The company currently operates two boats on local services from Marina del Rey, near Los Angeles Airport, and on non-scheduled charter trips to Catalina Island.

Earlier this year, it applied to the Public Utilities Commission of the State of California for authority to introduce scheduled passenger services between Marina del Rey and Avalon and Two Harbors, Catalina Island.

The application has been contested by Sea Planes Inc which, trading as Catalina Ferries, has been operating seasonal services on the Marina del Rey-Avalon-Two Harbors route for the past six years. In June 2006, the company introduced a 26m foil assisted catamaran.

RIM DRIVEN REVOLUTION CREATES NEW THRUSTER GENERATION

From Marine Propulsion, June/July 2007

Low noise levels, reduced weight and space saving advantages over traditional bow and stern thrusters, coupled with high performance, robustness and environmental friendliness, are cited for rim-driven designs.

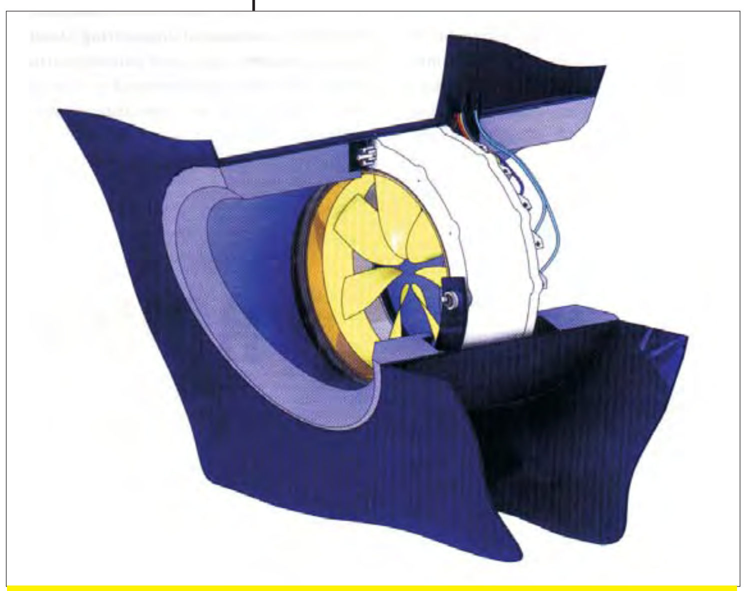
Various methods of countering cavitation noise in conventional tunnel thrusters - a development focus in recent years - include air injection systems and insulating arrangements that minimize mechanical contact with a ship's hull via flexible rubber mountings and insulation chambers. Van der Velden Marine Systems' rim-driven EPS thruster, however, is designed to counter cavitation at its source, explains the Dutch company's project manager for R&D, Chris Maat: "Cavitation noise is mainly generated at tip vortices by the pressure differential between the pressure and suction sides of the propeller blades. In tunnel thrusters and nozzles this is amplified by the clearance between the propeller tip and the tunnel wall.

"Our development team proposed attaching the blades to an outer ring rather than to the central hub. This would eliminate the clearance and block the contact between the pressure and suction sides of the propeller blade, thereby preventing the generation of tip vortices. Free propeller tips in the center have a far lower speed and arc therefore less prone to cavitation."

There is nothing new in the idea of having a propeller with its blades connected to a ring and driven by that same ring rather than a central hub. Reference literature shows that one of the first to patent this concept was the German inventor Kort in the 1930s as an extension to his famous nozzle.

Kort even proposed arranging an electric motor around the ring driving the propeller. After all, if the motor is placed on the outer ring it can produce a far greater torque due to its increased arm. This would eliminate the need for mechanical gears and give the propeller an undisturbed inflow.

It took another 70 years for the idea to be translated into commercial reality. The final breakthrough was fed by the availability of high-density permanent magnet drives and sensor-less control technology as well as advances in bearing technology.



EPS Tunnel Thruster Arrangement

In developing the EPS thruster, Van der Velden formed a consortium with the Dutch companies Airborne Development, Combimac and JB Besturingstechniek. Its design is divided into four main functional groups: the propeller, ring motor assembly, controls and the unit's mounting into the hull.

Continued on Next Page

RIM DRIVEN REVOLUTION
(Continued From Previous Page)

Propeller - As a mechanism that transforms the rotational energy of the ring motor into actual thrust, this performs a key function. Having the propeller blades mounted on a ring rather than a central hub offers potentially significant opportunities to reduce cavitation noise. A relatively high number of blades - no less than seven - further reduces the blade load and thus the risk of cavitation.

A compromise between thrust performance and noise was found for the blade profile, as thrust is also important for vessel operators. The blades are constructed from fiber-reinforced plastic that offers two main advantages over traditional metallic blades:

- a lower weight reduces a propeller's inertia compared with the rotor part of the ring motor. The total inertia of the blades is only a fraction of the rotor inertia, eliminating a need for balancing and stopping any damage to the blade from excessive noise or vibration.
- favorable sound-dampening properties, which help to curb cavitation noise that cannot be entirely avoided.

Tests on the fiber-reinforced plastic blades have demonstrated that their mechanical strength is excellent.

Ring Motor Assembly - The availability of permanent magnet (PM) electric motors proved valuable when development of the EPS thruster was started, in contrast to earlier attempts to design a rim-driven thruster. The high power density of PM machines fosters a compact motor design.

The rotor part incorporates the permanent magnets which, when combined with the sensor-less drive technology, need no mechanical contact with the stator. This allows for a new approach to the scaling problem: rather than trying to seal the gap between rotor and stator, the system enables water to flow freely between them. Both rotor and stator are well protected against water.

A key issue to be resolved was to design journal and thrust bearings that could operate in the water. While water-lubricated propeller shaft bearings are well known in shipping, placing the bearing on the outer diameter of the propeller drastically increases the sliding velocity. All commercially available water-lubricated bearings operate at speeds up to 7mm/second, whereas a sliding velocity up to four times faster is required for a rim-driven thruster.

Research by Delft University of Technology's mechanical engineering faculty led to a suitable thrust and journal bearing design that has been patented by Van der Velden Marine Systems. Operating in plain unfiltered seawater, it is able to withstand the erosive effects of sand, mud, debris and organic material.

Various material combinations were tested at Delft. The erosive material found in natural seawater was simulated by test water containing 5 per cent pure quartz, which was kept in suspension. The results confirmed it was possible to design a bearing with an operational life of 10 years in bow or stern thrusters.

Controls - The EPS thruster is controlled by one or two frequency converters, depending on its size. In larger models (800 mm in cross-section and above) the motor is constructed with double stator windings.

A single thruster can be controlled by two frequency converters, each delivering half the total consumed power. Should a stator winding or frequency converter malfunction, the EPS thruster is still able to operate at half its power. Using sensor-less control technology makes the system resistant to its environment, especially the impact of debris, sand and biofouling.

Ship Mounting - An unconventional design offers new possibilities for mounting an EPS thruster into the hull. The tunnel thruster version is mounted to a special ring, the dimensions of the thruster and tunnel ensuring there is a gap between the two. This gap allows a small amount of water to freely circulate around the thruster, thus cooling the motor.

The EPS thruster is mounted in a resilient arrangement using flexible rubber mounts on a ring that is welded into the tunnel; the mounting system avoids direct mechanical contact between thruster and hull. Power cables pass into the hull using a feed-through.

To ensure proper inflow to the propeller, a streamline insert is placed on both sides of the thruster, reducing the tunnel diameter to the actual propeller diameter. Such an installation method also allows a yard to install the thruster much later in the vessel construction process.

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RIM DRIVEN REVOLUTION
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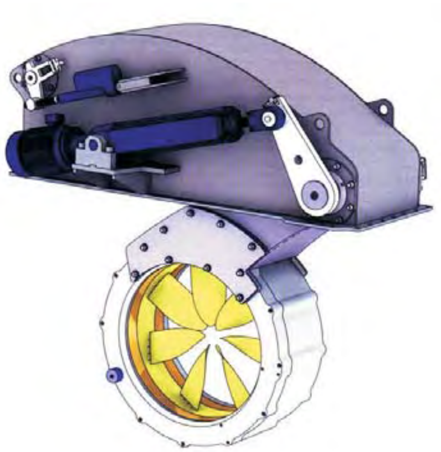
Although various elements had been subjected to trials - for example, the bearing and propeller blades were tested for mechanical strength - a test of the complete EPS thruster was deemed necessary to obtain total performance data with respect to thrust and noise.



EPS Thruster In Retractable Form

Avoiding scaling problems, a full size test was carried out in Marin's high speed tank at Wageningen in the Netherlands using a l80kW EPS800 thruster arranged in a 2 x 3.5m mock-up bow section.

Thanks to the symmetrical inflow and outflow in the EPS thruster, the measured thrust is equal on both sides: significantly different from conventional thrusters, which exhibit differences in performance between port and starboard of up to 15 per cent. As well as being fully symmetrical, the delivered thrust per kW is slightly better than that of a conventional thruster.

Noise generated by the thruster can be divided into two distinct groups: broadband noise generated by cavitation, and distinct frequencies generated by the blade passing frequency or the frequency drive. The latter are clearly present and comparable to those of a conventional frequency-driven thruster. The dominant broadband cavitation noise, however, is of a magnitude 5-10dB lower in the EPS thruster.

Priority was given to noise issues during development of the EPS thruster but the rim-driven construction offers other benefits. The permanent magnet motor design and its direct cooling to the surrounding water facilitate greater power densities.

Such advantages open up applications additional to auxiliary bow and stern thruster installations, such as fully retractable propulsion systems for larger sailing yachts (leaving the hull undisturbed during sailing mode). Vertically adjustable propellers based on the EPS also offer merits for tonnage operating in shallow waters, allowing the propellers of inland and coastal vessels to stay fully submerged regardless of load.

EPS thrusters are available with five inner diameters (450, 550, 650, 800 and 1,050mm) and with 12 power ratings (22 to 295kW) as a tunnel or retractable thruster. Three installations are in service, but seven larger and some smaller versions were on order in May 2007.

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RODRIQUEZ'S NEW FERRY DESIGNS ARE ALMOST READY

From Ferry Technology August/September 2007

Rodriquez has recently revealed that the first prototypes of its new-generation hydrofoil and AliSwath designs are nearing completion. "There are two new-generation hydrofoils under construction at our yard in Messina, and we will start testing the first of them in September," says Marco Pavoncelli, fast ferry business manager at Rodriquez Cantieri Navali. "Also, the AliSwath's hull and gondola have been built, and the yard is now constructing the prototype's superstructure."

Rendering of AliSwath

Once built, Rodriquez will look for an operator to collaborate in commercial trialling of the first hydrofoil prototype, so that the builder can look at ways to improve upon the design. The same will also be true of the prototype AliSwath. Rodriquez is already working closely with Italian classification society RINa on the latter project.

Rodriquez is building two variants of the passenger-only new-generation hydrofoil; one with a shaft and propeller arrangement and one with Rodriquez-supplied pods. The Aliswath is designed for low wake and low fuel consumption. It will be

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RODRIQUEZ'S NEW FERRY DESIGNS

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able to operate at speeds of 28 to 30 knots, and unlike the hydrofoils, will also have a car-carrying capability.

"Both these designs form part of Rodriquez's focus on building ferries with an environmental focus," Mr Pavoncelli says. "We are really concentrating on new projects and are always trying to improve our designs to meet market needs. We are increasingly more careful about new issues such as the environment and lowering running costs, and really believe that we are innovative in this field."

Mr Pavoncelli notes that: 'Although we have never worked directly with port authorities when considering our ferry designs, the operators for whom we are building certainly do; therefore we are indirectly involved with them. We build vessels that not only meet an owner's needs, but hat also meet the requirements and limitations of the ports that they serve."

He also highlighted a healthy fast ferry order book, with five 52m wave piercing catamarans on order at the Messina yard for the government of Oman. "'The first delivery is scheduled for November this year. This contract was extremely important to us as it is our largest ever commercial fast ferry contract, worth around US$90 million." All the vessels will be capable of speeds of over 40 knots and will each have a four-engine propulsion package. Three of them will be passenger only vessels and two will have a flexible design to allow them to operate in a rescue role."

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A RADICAL KEEL

Extracted by Permission from Professional Boat Builder, October/November 2007

A true engineer, Jonathan Howes spends a lot of time trying to make things work better-in the marine universe in particular. Projects to date have focused on several noteworthy subjects: a ducted hull (for which no information is currently available); a monofoil sailboat whose canted wing lifts the fuselage/hull out of the water so that only a foil remains immersed ; and a so-called Loop Keel, which is essentially a bulb affixed to the bottom of a sailboat's hull by two convex blades or keel appendages.

To develop these concepts into marketable products, Howes teamed with businessman James Macnaghten to form Howes Macnaghten Technology Marine, based in Cambridge, United Kingdom.

A patent on the Loop Keel was granted in 2003.

Comparing the Loop Keel to a fin keel of equal area and mass, Howes cites the following benefits: extra power from dynamic righting, improved keel efficiency owing to the two "keel limbs," which make its effective draft "40% greater than its actual geometry", improved broach resistance, because when heeled, the forward part of the keel comes out of the water, effectively moving the lateral center of pressure aft; variable displacement; resistance to stalling, since the keel is angled back and in; and superior structure, because the rigging chain plates can be attached directly to the keel.

Rendering of Loop Keel

Here's Howes's explanation of variable displacement: "The Loop Keel makes a yacht more stable by interacting with the water flowing past it. The interaction 'attaches' the water to the keel in a "bound vortex" and means that any movement of the keel also has to move the attached water. This allows the mass of that water to be treated as if it had been added to the yacht.

Howes, as it happens, is an aeronautical engineer, so it's not surprising that he is drawn some of his inspiration from aircraft. He notes that a number of airplanes have spread the load between two "limbs", notably the biplane, but also the box-wing and ring-wing designs enabling each to

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LOOP KEEL
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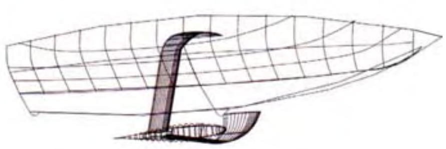
behave as though it has more wing-span than it actually does.



Loop Keel Showing Bulb

To test his keel concept, two Laser hulls were obtained, one fitted with a Loop Keel, in which a 50-kg (110-1b) bulb was secured to the hull by 50mm x 25mm (2" x 1”) steel beams bent to the correct profile, over which a wood epoxy foil was fashioned and faired. The second hull was fitted with a conventional fin keel with bulb, totaling the same Surface area and weight. Tank tests of each were conducted at Southampton University’s Wolfson Unit. Some adjustments were made, such as moving the experimental keel aft 200mm (8") and the results are the basis for the above stated claims. Both boats were also rigged and sailed in the ocean for real-life analysis.

DR. WANKEL RE-INVENTS THE BOAT

Extracted from Popular Science, June 1972
By Max Fehlmann
(Courtesy of Bob Miller, IHS Member).
A boat you can almost drive like a car on water? Sounds fantastic. Yet this boat exists, and has been tested successfully as a [radio controlled] scale model. Two full-size boats are now under construction, and testing will start this month (June 1972).

The inventor is Dr. Felix Wankel, the same man who built the rotary engine bearing his name. Today he is still developing the engine, but in his spare time he has been re-inventing the boat. He calls it the Zisch-boat. The word “zisch” is German for “zip.” Propulsion is by a Wankel engine, of course, through a normal inboard/ outboard drive.

Dr. Wankel has been toying with ideas for new types of boats on and off since 1937. Growing traffic congestion on land led him to revive the Zisch boat project in 1962. Dr. Wankel thinks we must make better use of waterways and oceans for personal transportation, for mass transit cannot provide a complete solution. .

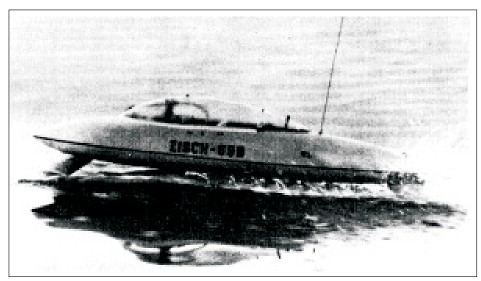
Front View of the Zisch-Boat (Note the Bi-Foil Arrangement)

Dr. Wankel set out to create a boat with the size, weight, carrying capacity, and speed’ of a passenger car, capable of travel on the high seas as well as in smooth waters.

The Zisch-boat will do it. Scale model tests, both in tanks and on Lake Constance, have proved its feasibility. Wave tests, particularly, show convincing evidence of its true oceangoing capability. The waves were created either by larger surface craft or by warm alpine winds. I have seen films made during these tests, showing the Zisch-boat in waves ten times higher than its length plummet into the water and resurface with little loss of either speed or stability.

The photo below shows a radio -controlled model taken at Lake Constance. [Ed Note: A modern version of the Zisch boat has been reinvented by Katoro Horiuchi; see page 7 of Third Quarter, 2007 IHS Newsletter.]

I have seen demonstrations in the tank of its fantastic stability, provided by its low center of gravity, and the high waterline at the stern. It will return to its normal upright position when placed on its side on the water, and even when placed upside down in the tank. Riding the wave crest sideways on the lake once resulted in complete capsizing. Recovery was automatic, as a continued roll motion.



Model skims along fairly smooth surface of Lake Constance at scale speeds corresponding to modern superhighway traffic.

The Zisch-boat is not the result of one single new idea, but a combination of several new ideas. As in the invention of his rotary engine, Dr. Wankel showed fresh inspiration and completely original thinking.

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ZISCH-BOAT
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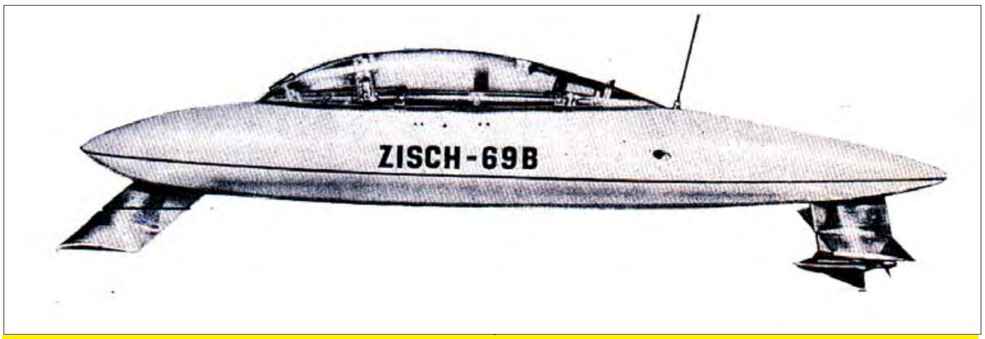
The demands of ocean-going capability have kept all conventional high-speed small craft off the high seas. The higher the requirements for rough-sea navigation, the broader, higher, and heavier the vessel. Horsepower requirement and building costs rise in proportion. The success of the Zisch-boat project depends on fulfilling two apparently contradictory conditions: It must be small, but highly seaworthy, and it must be fast.

Dr. Wankel solved it with a simple device.

The air intake is located on the upper portion of the windshield. The opening is equipped with a valve that closes when the boat is showered or about to be submerged. The valve is controlled by a sensor at the windshield base. The sensor takes the form of a small airscrew, It spins freely in the wind. The spinning shaft sends a signal to the valve to stay open. When a wave hits the windshield base, the airscrew stops its rotation. Instantly, a signal is sent to close the air-intake valve. When the airscrew resurfaces, it resumes spinning, and the valve is reopened. The closed cabin has been successfully tested in full scale. It was mounted on a conventional motorboat, a British-built Avenger, and extensively tested in the North Sea.



Profile View of the Zisch-Boat

Clearly, hull shapes intended for constant surface contact would not be suitable. What, then-a submarine? No, a surface vessel, but borrowing something from the submarine. The hull is torpedo-shaped. If the Zisch boat is to run in waves many times higher than the length of the hull, it will be completely submerged from time to time. The torpedo shape assures low drag, which means smaller speed loss during its moments of submersion.

The hull has a glass top over the passenger compartment, enclosing the interior of the floating hull. The closed cabin was an absolute necessity. Any opening would rapidly fill the hull with water. That posed another problem. The occupants require ventilation, and the engine needs air.

The inboard/outboard drive works as a rudder and steers the Zisch-boat with precision.

The hull is submerged to the waterline at zero speed, but "glide flaps" (foils) lift it out of the water on acceleration-quicker than conventional hydrofoils, and with less power needed. [Ed Note: This is because the foil area is relatively large and hence a relatively low foil loading.]

But the hull was only part of the solution. Alone, the torpedo hull lacks the desired stability, flotation, and. speed capacity, Dr. Wankel wanted a surface vessel (since air drag is so much lower than water drag). As such, it would have to fight the waves.

Conventional surface craft fight waves by pounding against them. Dr. Wankel found his answer in cutting them off at the base, and thereby maintaining the boat in a steady level position. How?

Naturally, Dr. Wankel was influenced by the hydrofoil. Since hydrofoils have come into general use, a small marine revolution has taken place, both in civilian craft and military applications, to obtain higher speeds.

Dr. Wankel began to experiment with new foil designs of his own. After several years, he had developed an extreme variant on the hydrofoil principle, a design best described as "glide flaps", As used on the Zisch-boat, the "glide flaps" are mounted as far apart as possible, with inclined stilts to support the hull. The shape of the "glide flaps" is of vital importance to their function. They do not ride the waves, but cut through them. In smooth waters, they just skim the surface. They have a wing profile with an absolutely flat bottom, set in an almost horizontal position. Under water, they have no more drag than a hydrofoil, but have larger surface, and correspond fairly closely to the flotation area of a boat with flat

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THERE'S MORE THAN ONE WAY TO CHALLENGE THE SPEED RECORD

By Jim Flannery and Jason Fell

[Extracted from "Soundings", July 2007 by permission]

Fifty knots has been as elusive for sailors as the four-minute mile was for runners and the sound barrier for pilots, but Paul Larsen and Malcolm Barnsley say SailRocket is ready to clock that speed and make history.

Not a proa or catamaran or monohull or sailboard or kitesurfer, SailRocket is its own animal. "it is totally unique," says Barnsley, 50, its British designer. "I believe it is the best way to do 50 knots."

Australian Larsen, the project manager and skipper, took SailRocket to Walvis Bay, Namibia in southwest Africa in early March to challenge the sailing speed record of 48.7 knots set by boardsailor Finian Maynard in 2005. On April 9 the 33-foot sailboat posted its best speed yet - 38.3 knots - and did it with one of the two small planing surfaces that it rides on damaged. "The back one ripped off at the start of the run, leaving a very jagged surface," says Barnsley, speaking to Soundings from his home in Southampton, England. "The back was sinking in and dragging very badly. By all calculations we should never have gone 38 knots, but we did."

He says independently corroborated speed predictions suggest that SailRocket will reach 2.6 times wind speed at 20 knots, which means it could set a new record with just more than 19 knots of wind. But judging from its performance with a damaged hull, Barnsley believes SailRocket's, predicted speed is way too conservative. "We may do a lot more than 50 knots," he says, presuming all goes well.

In its first run on Walvis Bay, SailRocket went into a spin at 34 knots, snapping the mast of its new solid-wing sail - a result of not balancing the wing sail and hydrofoil quite right, Barnsley says. Larsen suspended racing for two weeks to repair the damage. The speedster went back into the shop April 9 to rebuild the aft planing surface and again April 24 to replace the forward one, which also was deteriorating. Both were strengthened to better handle a small chop on the bay.

Barnsley and His SailRocket

Spidery and sleek, SailRocket is designed to have no heeling moment, which is the main limitation to most designs going faster, and a source of control problems at high speeds, Conventional sailboats counteract heeling with weight, which causes drag. SailRocket's pencil-thin 33-foot carbon-fiber sandwich hull rides on tiny planing surfaces fore and aft, each about the size of a paperback book.

Barnsley, a senior test engineer for Vestas, which manufactures huge composite construction blades for wind generators, eliminates heel by putting a solid-wing sail out on a crossbeam that extends 25 feet out from the bow. The wing is canted inward at the same angle as an inward-canting hydrofoil, or wing, that extends down into the water, also at the bow.

Speed predictions suggest that SailRocket will reach 2.6 times wind speed at 20 knots, and that should be enough for Larsen to eclipse 50 knots.

Barnsley says SailRocket doesn't like waves of any size. A 2-inch chop reduces speed 6 knots. "Six-inch waves, forget it," he says. "We wouldn't ever try to sail the boat in that. It would kill it dead."

SailRocket's design is so radically different than any other sailboat challenging the 50-knot barrier that Barnsley isn't sure what genus it falls into. "We need to invent a name for the concept," he says.

Barnsley says the purpose of the hydrofoil isn't to lift the boat out of the water (SailRocket planes) rather its

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THERE'S MORE THAN ONE WAY TO CHALLENGE THE SPEED RECORD

(Continued From Previous Page)

purpose is to counteract the heeling moment of the sail.

When the 22-square-meter wing sail, hydrofoil and crossbeam are all properly balanced geometrically, there is no heeling moment, Barnsley says, so all the energy from the wind goes into pushing the boat forward, not over on its side. SailRocket has two rudders: a standard sea rudder, which the pilot uses at speeds up to about 40 knots, and an air rudder, which works like an aircrafts tail rudder and is deployed at 40 knots after retracting the sea rudder.

Barnsley says when properly balanced SailRocket is naturally stable. "There really shouldn't be a need for the pilot to do anything once he hits the start gate" he, says. "He only has to go for 20 seconds."

The team chose Walvis Bay to challenge the record because of the favorable conditions there for speed runs. Barnsley says the wind is the right strength (18 to 22 knots) and blows from the right direction relative to the 500-meter course 80 percent of the time from March into May. The course is set up 15 to 20 meters off a low, flat, treeless spit of beach, and because the wind usually blows off the beach it has no dead spots and, in the beach's lee, chop is minimized. Best wind is 20 degrees abaft SailRocket's beam, a slightly broad reach, Barnsley says.

The designer says he is "100 percent confident" that SailRocket will break the world record. He also is quite sure it can break 50 knots so long as ventilation (air getting sucked down around the planing surfaces) doesn't become a problem and cause drag. "We've not seen any evidence of that so far," he says.

Theoretical predictions say that the boat can sail 55 knots in 22 knots of wind, but at 53 knots, cavitation (tiny bubbles of water caused by the low pressure around the foils) is sure to kick in and cause additional drag SailRocket's foil is designed to suppress cavitation, Barnsley says. "If the cavitation is relatively mild, we could find ourselves doing 55 knots," he says.

Larsen, however, won't be reaching for that speed until he is ready. He will crank the speed up slowly in successive runs, testing the balance, testing his control - and tweaking, tweaking, tweaking. "We are very much aware that one big crunch could be the end of this project, so we want to be very careful," Barnsley says.

For more than a decade, no wind-powered vessel was faster on the water than the 30-foot trimaran, Yellow Pages Endeavour, sailed by Australian Simon McKeon which reached 46.52 knots in October 1993 off Sandy Point, Australia.

That changed, in November 2004, when Irish boardsailor Finian Maynard touched 46.82 knots over 500 meters on a canal known as the "French Trench" in Saintes Maries de la Mer, France, making him the fastest sailor on the planet. Five months later, in April 2005, Maynard topped his own time, reaching the current record of 48.7 knots. In October 2005 Maynard also set the mark for the fastest nautical mile: 39.97 knots. That record was broken a year later by Dutch boardsailor Bjorn Dunkerbeck, who touched 41.14 knots. The records were ratified by the World Sailing Speed Record Council (www.sailspeed records.com).

Maynard, who is 32, began boardsailing at age 8 with his parents in the British Virgin Islands, where he now lives. Standing 6 feet, 2 inches tall and weighing nearly 260 pounds, some say his size and strength help him maneuver his sailboard in 40- to 50-knot gusts.

Today, Maynard heads a small group of fellow speed sailors called the Masters of Speed (www.masters ofspeed.com). Their mission is to accomplish what no other sailor has yet to do: break the 50-knot barrier. - Jason Fell

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ZISCH-BOAT

(Continued From Page 9)

bottom, of similar weight, when running on perfectly smooth water.

At zero speed, the Zisch-boat looks like a fish with only its tail in the water. Of course, the belly is also submerged. The important thing is that these submerged "glide flaps" soon rise to the surface as the boat gains speed, and bring the entire hull out of the water.

Early tests established the superiority of the glide flap with the flat underside over other types of hydrofoils. It was also found that the boat's behavior was greatly dependent on the pitch angle of the glide flap. By a change in pitch, the Zisch-boat could be changed from running through the waves to making long leaps in and out of the water surface. In neither case was there any substantial loss of speed, nor was there any pounding against the waves. Pitch movements were held within a tight range, parallel within a few degrees to the waterline.

Now that the Wankel engine is [was in 1972] revolutionizing the automobile industry worldwide, will we see a similar "Wankelizing" in boating?

IHS SURVEY

(Continued From Page 2)

- If you are concerned about privacy, you can opt to restrict your data to the IHS membership or to the IHS Board of Directors only.

- If you are concerned about the time required to complete the survey form you should be aware that it takes only about 20 minutes maximum. Unless you have an unusually broad background in all types of hydrofoils, there are whole categories that you can skip (military, commercial, recreational, powered/sail/human) etc. In fact, had you started your form when you started reading this Newsletter, you would be done by now!

Please cooperate and complete your survey form at your earliest convenience.

If you have misplaced your form, you can download it at or we will send you another form. To get another form, or if you have any questions or comments, please contact George Jenkins: ; or phone: (703-683-4357)

24-MILE ELECTRIC BOAT RACE

By Charlie Iliff, IHS Member

At the Wye Island Marathon, on the Eastern Shore of Maryland in October, I set a new record at about 9 knots with a 58' 8-oar shell, with an electric outboard. I am now threatened with the Duffy Voyager, a high-dollar electric boat that can sustain 20 knots for two hours. So, I need something that will go at least in the low 20s, with minimal power. (I have a lot of propeller work to do before I will have enough efficiency even to try, but I'm working on that.) Because of minimal budget, I'm stuck with lead acid batteries. Best case, I have about 350lb of batteries to carry, and best efficiency maybe 4 hp for an hour and a quarter (unless someone wants to lend me about $30,000 worth of lithium polymer batteries.) So, for maximum efficiency and some semblance of control, after reading a lot here, the Icarus and other sail work, and looking closely at a foiler moth, I've tentatively concluded that Ilett-type inverted T-foils with wand depth controls at the four corners are a possible configuration. I'd appreciate any suggestions or encouragement. (Or agreement with my computer which says I'll make it about half the distance.)

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