The NEWSLETTER

International Hydrofoil Society

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

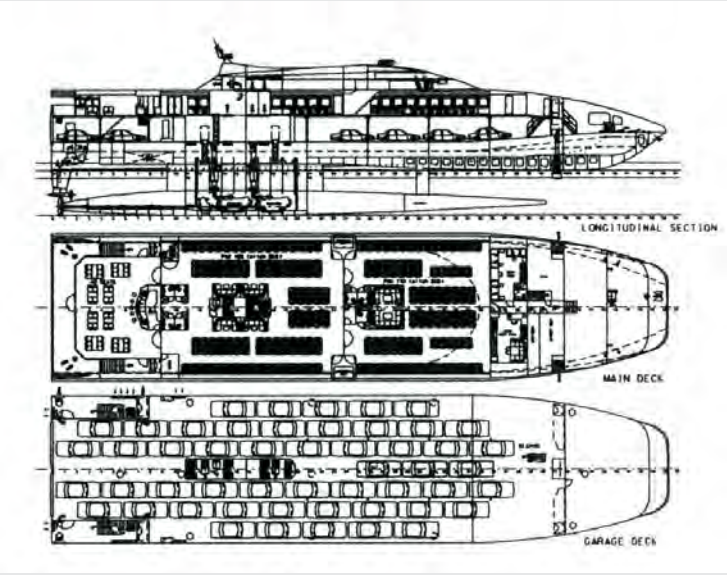
Editor: John R. Meyer | First Quarter 2008 | Sailing Editor: Martin Grimm

STRUCTURAL DESIGN OF AN INNOVATIVE PASSENGER VESSEL

Extract from a technical paper by Dario Boote and Donatella Mascia; Dipartimento di Ingegneria Navale e Tecnologie Marine University of Genova (Italy)

The paper was presented at the 2nd International Conference on Marine Research and Transportation held in June 2007.

The main features are described related to the development of an innovative passenger ship, starting from the concept design up to the final realization of the full-scale prototype. The vessel is a very unconventional solution for the employment in the short-range passenger traffic with a low environmental impact. The proposed solution has been inspired by both hydrofoil and SWATH technologies with the aim of matching relatively high speeds, low environmental impact and reduced wave making. The acronym for this hybrid vessel has been chosen as ENVIROALISWATH, a term which indicates all the mentioned design



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PRESIDENT'S COLUMN

To All IHS Members

I am pleased to report the Society's continued growth last year with a total of 27 new members added to the IHS Membership roles. By the way, you can view the Membership List (a new one was generated in January, 2008) 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). If the information is incorrect, please send changes to: Steve Chorney: schorney @comcast.net

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 www. foils.org/member.htm and follow the instructions.

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 "HCAC (Hybrid Catamaran Air Cushion) Development", presented by Robert Moore & Kenneth Maloney; Textron Marine & Land Systems. A copy of the presentation will appear on the IHS website, so be on the lookout for it.

As I mentioned before, Ken Spaulding is spearheading 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. We have selected a contractor, High Caliber Solutions, to open a new hydrofoil website linked to the IHS site. As we move along, we will keep you up to date on its contents and progress.

Those of you who download the News Letter from the website are in for a special treat of additional pages (beyond the usual 12 in the printed version). This time Doug Halsey and Barney Black have collaborated on a description with many photos of a unique hydrofoil sailboat called "Broomstick", a 15' long, 17' wide, one-person trimaran that can be set up in a variety of ways. I recommend the article to all interested in sailing hydrofoils.

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 and/or suggestions to me (editor@foils.org), Bill Hockberger (w.hockberger@verizon.net), and Ken Spaulding (secretary@foils.org). We will be pleased to hear from you.

John Meyer, President

WELCOME NEW MEMBERS

Tom Haman - In 1988 Tom met Sam Bradfield In Melbourne Fla. at the Florida Institute of Technology when he arrived with NF3 an 18sq sailing hydrofoil designed for around the buoy racing. Sam and Tom began working together on this project and he has been with Sam and HydroSail Inc. ever since. They have built and tested numerous designs from the 16ft Rave to the 37ft offshore Racer SCAT. Today HydroSail Inc. has become HydroSail LLC, in which Tom is one third owner with Sam Bradfield and Mike McGarry.

James C. Sandison - Jim Sandison retired as Division Director, Strategic Sealift, Auxiliary Oceanographic, and High Speed Logistics Ships, Naval Sea Systems Command (NAVSEA 05D5). He has a long-term background in design, construction, and testing of ships. After beginning his career in Naval Systems Engineering Command (NAVSEC) as a diving and salvage systems engineer for the Bathyscaph TRIESTE**,** he has been involved with most of the Navy's Deep Submersibles, Mine Warfare ships, Oceanographic ships and commercial design-based noncombatant and high speed ships. He is a specialist in naval ships designed, built, and certified to commercial, U.S. Coast Guard, and American Bureau of Ships (ABS) requirements. He recently joined Maritime Applied Physics Corp. as a Senior Engineer.

Michael Schwartz - Mike recently joined CSC-Advanced Marine Center as Chief Engineer, and is interested in boat and craft designs

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INNOVATIVE VESSEL
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characteristics. [Ed Note: Also known as Aliswath; see related article on page 6.]

The Department of Naval Architecture of the University of Genova cooperated with Rodriquez Cantieri Navali to develop the complete design of this new vessel. The paper describes the development of the structural design.

The project of an innovative passenger ship with a very low wake wash, to be used in a short-range transport close to the shore, has been developed in cooperation between Rodriquez Cantieri Navali S.p.A of Messina and the Department of Naval Architecture of the University of Genova.

The new vessel is characterised by high performance, good manoeuvrability and controllability, typical of hydrofoils, and good sea keeping qualities and low installed power, typical of the SWATH solution. The investigations are aimed at realizing a full-scale prototype, to be built in Rodriquez Shipyards of Messina.

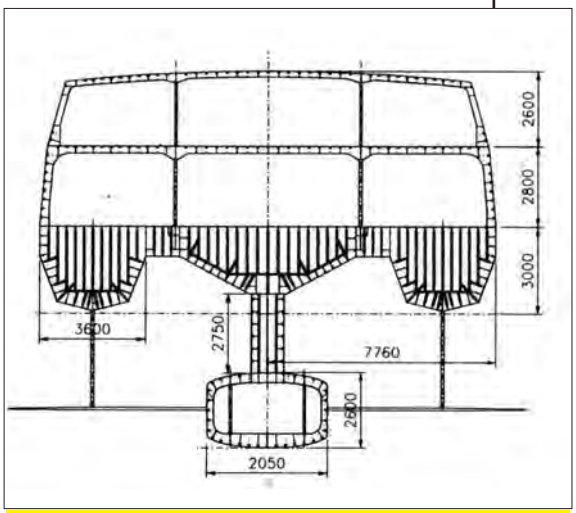
The vessel consists of two main components: the hull, where cargo and passengers are located, and a submerged body in which the main engine and the fuel tanks are installed. Hull and submerged body are connected together by means of two column structures, a bigger one in the aft part of the vessel and a very small one forward.

Four foils provide the dynamic lift to sustain the vessel when running at cruise speed (25-27 knots).

The hull, characterised by a trimaran type layout, is 63 meters long, 15.5 meters wide and 10.30 meters high and accommodates 450 passengers and 50 cars.

The submerged body has a length of 50 m, a breadth of 4. 10 m and a depth of 2.6 m and provides 80% of the hydrostatic buoyancy. The remaining 20% is assured, at zero speed and in the pre-planing phase, by the two lateral hull bodies and, at cruise speed, by the lifting force developed by the four foils.

The structure has a longitudinal lay-out with web frame spacing of 1250 mm and longitudinal stiffener spacing of 300 mm. Bottom plating is a constant thickness, except in the connection to the central hull zone, where it is increased. The two decks are fitted with two girders, one on each side of the symmetry plane, supported by circular section steel pillars. The submerged body maintains the longitudinal structure, with reinforced frames aligned with those of the hull. Bottom floors are longitudinally connected by two fore and aft lateral keelsons, plus a central one in the engine room.



ENVIROALISWATH Main Section

Note: The dimension for the breadth of the lower hull is in error; it should be 4100 mm

Hull and submerged body structures are made of AlMg 5083 light alloy; foils supports and pillars are made of Fe5 10 steel. A typical cross section is shown here.

The design process of this vessel has been assessed through the development of all those aspects falling out from conventional ship design. They mainly are represented by the research of the most suitable hull shape, the study of the propulsion system, the analysis of the environmental impact and the structural layout which should comply with all previously defined design parameters.

The first phase of the project was devoted to the structural concept and geometry layout; afterwards, by applying different HSC Rules, the preliminary scantling was laid down and improved by simplified direct calculations. A further refinement of the structure scantlings has been then carried out by a finite element analysis of the hull and of the submerged body, separately modeled.

In this paper the final part of the structural design is presented. FEM models have been developed on the complete vessel, updated with all the variants suggested by stress and strain requirements, by taking into account the new outfit layout. This investigation, the results of which allowed the construction of the full-scale model, will be further improved by experimental investigation on the prototype. [Ed Note: A complete copy of the paper is available at: http://www.icmrt07.unina.it/]

HYDROSAIL - NEW SUSTAINING MEMBER

HYDROSAIL Ltd Liability Corporation (LLC) has over 50 years of experience designing, engineering, fabricating, and sailing hydrofoil boats and hydrofoil control systems. After designing a hydrofoil system that set world sailing speed records in 1979, the team at HydroSail moved forward to design hydrofoil systems which are practical for everyday sailors and racers! Whether coastal racing at over 30 knots, or just tacking out of a crowded harbor, these hydrofoils are a dream to sail.

HydroSail has the expertise to design boats of nearly any size which can fly fast. Designs for production boats, or custom racers from 16' to 60' can be built to meet one's needs.

Dr. Sam Bradfield's passion is sailing fast. He spent eight years teaching and researching at the University of Minnesota in aeronautical engineering before moving back to private industry and eventually to Florida. His expertise in fluid dynamics and advanced wind-powered watercraft eventually led from aircraft to sail-powered hydrofoils. He designed NF2, "Neither Fish Nor Fowl". NF2 captured and held the Class C world speed sailing record between 1978 and 1982.

Sam and his associates at HydroSail, LLC, Mike McGarry and Tom Haman, set their sights on developing practical applications which could bring hydrofoil sailing and racing to regular folks. They developed foils for wind surfers and retrofits for existing multihulls. According to Mike, one of the problems with retrofits is that the original boats were not designed to handle the additional loads required to sail flat with hydrofoils. "It's much easier to design the boat right from scratch". Action photographs of 10 HydroSail, LLC prototype vehicles developed between 1973 and 2007 are shown on the website: www.homepage.aol/HYDROSAIL

Current HydroSail design efforts are concerned with developing the electronic aspects of the sailing vehicle flight control system. The ultimate goals of the project are stabilization and comfort control of the vehicle.

METEOR HYDROFOIL MONUMENT

An early Meteor hydrofoil as a monument to Rostislav Evgenievich Alekseev has been erected in the center of Sormovo on Alekseev Square.

METEOR Monument

This is the hydrofoil monument (it's a real Meteor) located at the Alekseev's Square in Nizhniy Novgorod, Russia

Four Meteor or similar hydrofoils are also tied up alongside one another in the river to the East of this site..

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THE RUSSIAN AERO-MARINE

A book by Bruno De Michelis

Bruno De Michelis has produced a highly comprehensive book on the subject of Russian and Soviet seaplanes, flying boats, amphibians and ground-effect craft from the origins (1910) to the year 2000.

The Preface by Francois – Marc de Piolenc follows: To all of us living outside the orbit of the old Union of Soviet Socialist Republics, the flying boat would appear to be a dying breed, its last remaining representatives holdovers of a bygone era. In the West, the military and naval use of flying boats ended in the '60s. After that the few remaining craft were flying rich businessmen around the Caribbean, carrying tourists for joy flights in Europe, fighting forest fires or performing search and rescue work on the Asian littoral.

With the retirement of the big flying boats, the teams of designers (who created the machines that pioneered all the world's long-distance air transport routes, inaugurated most of the advanced features of modern aircraft and flew thousands of hours on patrol in fair and foul weather) were disbanded. With time, the expertise to build seaplanes, flying boats and

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amphibious aircraft disappeared from Western design bureaux and even the advocacy of the type faded, as those who fully understood what these machines could do, retired without having been given the opportunity to train competent successors.

On the other side of the Iron Curtain, the opposite happened. Just as most American and European flying boats were being scrapped, their sisters were coming of age in Russia. Unlike their Western counterparts, Russian designers knew they could not afford to let water-based aircraft disappear; the vast distances between key points in the USSR, coupled with its Medieval infrastructure, kept alive the need for 'planes that could take off and land on any suitable body of water. The Imperial Russian forces had taken an early interest in seaplanes and flying boats, buying Western craft and studying them; their Communist successors continued the trend without interruption, soon producing their own types, better adapted to Russian conditions than the more delicate Western models. After the second World War (called Great Patriotic War in the USSR) the rapid technical advances that had materialized during the conflict were routinely incorporated into post-war flying boats and amphibious 'planes, narrowing the gap in performance between land-based and water-based craft. The same thing happened in the West (as in the remarkable Martin P6M and some others) but was completely forgotten when flying boats were set aside and the advanced prototypes were torched without leaving as much as a single example for a museum exhibit. With the development, in the '60s and '70s, of ground effect machines (ekranoplanes), Russian designers amazed the world with the new breed of fantastic craft, but political changes, bureaucratic impediments and financial difficulties killed even the development of these great, innovative creations. Only very few Russian companies are trying, nowadays, to produce modern flying boats / ground effect craft hybrids but, in spite of some successful results, lack of funds and international indifference seem to have substantially slowed their efforts.

This book represents a small but satisfying part of the great "peace dividend" that followed the dismantling of the Soviet empire by its own elite. For Western readers, it is a very comprehensive historical and technical report of what was, but also of "what could have been" on our side of the Socialist Divide, if wiser minds had prevailed. We are certain that our readers will be as rapt as we are in admiration of the sometimes bizarre, but often ingenious, contrivances presented in the following pages, which also include a vast collection of rare photographs and documents. With any luck, this work will trigger a "flying boat race" to rival the missile race and the space race that gave us so much of the technology that we now take for granted.

LOCUS OF A BOAT DESIGNER BY KOTARO HORIUCHI

Reviewed by Ray Vellinga (IHS Member)

What is the "American Dream"? To some it is having a good job, buying a house, starting a family and voting. Others believe the American Dream follow the examples of Alexander Graham Bell and Thomas Edison.

Their compulsion to invent things was as strong as their need for money, shelter, family and freedom, however this form of the American Dream may be more appropriately called the International Dream. The inventive spirit is everywhere, not just in America.

There is no finer example of an innovator and inventor than Kotaro Horiuchi (IHS Member), chief of the Yamaha Research and Development Center during the 1980s, head of Horuichi Laboratory and former director of Yamaha Motor Co. Mr. Horiuchi, like his company, is Japanese, but the R & D centers are in Los Angeles and Minnesota. Little wonder that many of the designs he created have strong appeal to Americans. Yamaha's market successes are well known: motorcycles, personal watercraft, etc. But the real excitement in this book is about the vehicles he created for special purposes and, for one reason or another, where never mass-marketed and therefore not widely known.

The versatile Mr. Horiuchi, in a period spanning over 50 years, designed conventional motorboats, sailboats, planes, helicopters, motorcycles, cars, SCUBA propulsion unit and even a river-powered generator. But his greatest efforts were focused on hydrofoil boats, and this book reveals their secrets. His best known hydrofoil is the OU32 that was feature on the Discovery Channel in 1999. This water-jet powered boat carries two persons in tandem and flies at 40mph. The pilot and passen-

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LOCUS OF A BOAT DESIGNER
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ger are belted in and protected by a locking clear transparent canopy.

The submerged foils allow the craft to make balanced turns while banking 45 degrees. The result is a 1.4G thrill ride. There are detailed drawings, descriptions, specifications and measurements to help the reader understand how this boat works.

During the 1990s there was a lot of interest in Japan about setting records with human powered hydrofoils. There were many boats but two stand out: the Cogito and the Super Phoenix. The fastest was the two rider Super Phoenix. It was designed and built by Yamaha engineer, Fumitaka Yokoyama, in Yamaha's facility under the direction of Mr. Horiuchi. In 1998 it flew at 19.51 knots. That is unofficially faster than the 18.5 knots of the MIT speed record holder, Decavitator, a one man hydrofoil. Officially, Super Phoenix was awarded the two man record by the International Human Powered Vehicle Association for the fastest flying start run through a 100 meter course at 18.67 Knots. This speed fell slightly short of their 20 knot goal.

Mr. Horiuchi generously details the final 5 modifications that were made on the Super Phoenix to permit it to fly faster, but even after these modifications its old record could not be beaten. Still optimistic, Mr. Horiuchi calculates that by increasing the rider power by 15% and decreasing the drag by 35% an otherwise similar boat would smash all records by reaching 24 knots. Sounds easy enough.

There are so many valuable projects in this book that one gets the feeling that Mr. Horiuchi, retired as of 1996, would like more than anything to see the abandoned ideas come back to life in the form of viable, profit making products. Many of his best ideas apparently were shelved because of unrelated circumstances, like the Japanese recession or the surge in product liability problems in the 1990s. Of course the biggest market for these ideas is here in the USA and surely it's no coincidence that this second edition is in English and available to Americans.

Included in the book is a 36 minute DVD. It is in NTSC format, region free; so it will play on your TV. There are 50 boats, planes and cars — many of which the reader probably never has seen. Excerpts from the DVD can be seen on youtube.com. Search for OU32 or Kotaro Horiuchi.

The book is important because of the large number of significant projects and the detail in which they are reported. This one should be in the library of every serious hydrofoil enthusiast and designer.

Locus is a large book, 308 pages of 8" X 11.5" print. It is filled with over 360 fine line drawings and photos. The line drawings in particular are works of art. About 40% of the book is devoted to hydrofoils, 20% for power boats, 10% for rowing shells, 10% two wheel powered vehicles, and 10% for airplanes and helicopters. The book is filled with great designer and engineering ideas with numbers, dimensions and details. This edition is priced at $99.00 plus $7.00 US shipping. Order it through Dr. Mike Timmons, 126 Sunset Drive, Ithaca, NY 14850. Email mbt3@cornell.edu Phone 607-227-5638.

DIVERSE PRODUCTION AT RODRIQUEZ'S MESSINA YARD

Extracted from Fast Ferry International, October 2007

Currently, there are six vessels under construction at the Rodriquez Cantieri Navali yard in Messina, Sicily. Three are wavepiercing catamarans, two are fully submerged hydrofoils and one is an Aliswath hybrid design.

The only surface piercing hydrofoils in the yard are two Foilmasters lifted ashore for maintenance. In the past 51 years, the Messina yard has delivered 167 surface-piercing hydrofoils. The latest, Foilrnaster *Gigliola M*, entered service this summer with Ustica Lines. It seems there will he no more.

Wavepiercers

Production is currently dominated by an order for five 52m wavepiercers placed last year by the Sultanate of Oman. Three are to be fitted out as ferries carrying 100 passengers and 22 cars, the other two as rescue vessels capable of carrying up to 200 people.

Although Rodriquez was responsible for the detail design of the vessels and tank testing, there is a strong Australian content in the project. AMD Marine Consulting contributed the basic design while Spear Green Design is responsible for the fit out and specification of the interiors and has produced corporate livery for the ferries.

Fully Submerged Hydrofoils

The Oman project has delayed the completion of two 37m hydrofoils fitted with fully submerged foil sys-

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DIVERSE PRODUCTION AT RODRIQUEZ'S MESSINA YARD

tems, preliminary details of which were released by Rodriquez at the end of 2004. The design features a hull built entirely in welded aluminium fitted with 'high resistance' steel foils.

Speaking at the 3rd Fast Ferry Information Conference in London at the end of September, Rodriquez fast ferry business manager Marco Pavoncelli said that the fully submerged hydrofoil offers lower fuel consumption than similar sized fast ferries, 950 litres per hour at 46 knots or 20.65 litres per knot; very good comfort on board with vertical accelerations of 0.07g rms in 1.5m significant seas; more available operating days due to continued service in Beaufort force 5-6 conditions; and a greater number of potential routes and better operational flexibility due to its 25% higher service speed.

According to Rodriquez research and development manager Michele Sferrazza, "The two prototypes will be developed with different propulsion systems, one with traditional fixed pitch propellers and a two speed gearbox, the other with an azimuth propeller.

The first gear will serve to reach the speed required for take-off, 24 to 30 knots, within 15 to 20 seconds, allowing the hull to emerge from the water without overloading the engines, while the second gear exploits all the available power." The trials program of the first vessel is due to start during Spring 2008.

Aliswath

The largest vessel under construction in Messina, the 64m Aliswath, features a trimaran structure forward, fully submerged foils and a single "swath-like" hull, or gondola as it is described by Rodriquez.

At service speed, the foils will provide 20% of lift and the buoyancy of the gondola will provide 80%. The gondola will house two MTU 16V 4000 M70 diesels powering a single propeller. Two MTU 16V 2000 M70 wing diesels in the hull will each power a podded tractor propeller.

Rendering of Aliswath

The project is a joint venture between Rodriquez, the University of Genoa, Registro Italiano Navale and the Krylov Institute. Advantages claimed for the design include improved seakeeping, lower fuel cosumption, a drastic reduction of wake wash, and minimization of airborne noise.

Comparing a Rodriquez TMV 70 monohull carrying 530 passengers and 57 cars, a deadweight of 137 tonnes, with an Aliswath 64m carrying 130 deadweight tonnes, Rodriquez says that installed powers are 9,400 kW and 6,800 kW respectively, fuel consumption is 2,200 litres/hour and 1,500 litres/hour, and a 28 knot service speed requires 100% maximum continuous rating (mcr) on the TMV 70 but only 90% mcr on the Aliswath 64m.

Aliswath Hull at Messina Yard

The hull of the Aliswath was partially built at the Rodriquez yard in Pietra Ligure and the gondola was produced in Messina. First trials of the vessel are expected to take place towards the end of 2008.

Aliswath Lower Hull Awaiting Mating With Upper Hull in the Messina Yard

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

HYDROFOIL BOATS OF THE SCHERTEL-SACHSENBERG-SYSTEM - A GERMAN DEVELOPMENT

The IHS was fortunate to receive a copy of this book (in German) written by Werner Hinsch and Klaus J. Sachsenberg and published by Verein zur Förderung des Lauenburger Schiffahrtsmuseums e.V. It's German title is: "Tragflügelboote des Schertel-Sachsenberg-Systems eine Deutsche Entwicklung". Volker Jost of Lucerne Switzerland was kind enough to provide this summary in English.

The book is a detailed compilation of the development of hydrofoil boats according to the Schertel-Sachsenberg principle in Germany and its continuation after WW II in Switzerland. This book covers the time frame from 1919, the first test boat of Hanns Freiherr Schertel von Burtenbach until about 1960.

Gotthard Sachsenberg was a very impressive personality and the opening chapter provides an overview of his various activities that are not commonly known. He engaged himself in a number of developments during WW I and WW II.

In the mid thirties he met von Schertel and they formed the Schertel-Sachsenberg-Schnellboots-Konsorti um. Further developments regarding hydrofoils were made under the umbrella of this agreement which remained in force even during SUPRAMAR times.

A vitae of von Schertel is really impressive and covers a time span from WW 1 until the 1980s. He died in 1985 in Hergiswil, Switzerland. The young von Schertel was very enthusiastic about airships (Zeppelins) and he intended to take up this trade as his profession. He designed hang-gliders and engaged himself in sail planes in the 1920ties. In between he built his first test hydrofoil boat in 1919. In 1923 he started his engineering studies at the Technical High School of Berlin for aircraft and naval architecture. He returned to his home town Wiesbaden and in a small boatyard and mechanical workshop he built a total of 7 test boats between 1927 and 1935. The real breakthrough came with boat No. 7 which demonstrated its capabilities when it covered the distance between Mainz and Cologne on the river Rhine in 3 hours and 4min with 7 persons aboard.

The book then describes the early developers of hydrofoil boats such as Enrico Forlanini (1906), Crocco, Ricaldoni (1908) and Bell-Baldwin in 1918 and the early tests of von Schertel from 1920 onwards. All his test boats are described. No. 8 the "Silbervogel" (Silver Bird) was the breakthrough. It was successfully demonstrated on the River Rhine in April 1936. It was also the time when the Consortial-Agreement with Gotthard Sachsenberg was concluded (Oct. 1936).

Von Schertel was very much engaged in the improvement of the foil system and he used various German institutions for testing. A number of patents were granted. All this development finally led to the Schertel-Sachsenberg-System with the well-known surface piercing foils. He knew that this was not the ideal system regarding seaworthiness and riding comfort, but for a fully submerged foil system was not yet mature at the time.

The design features of the system are described as well as its sea capability and the state of the art at the end of WW II (1945) is summarized. The chapter ends with a view to the various activities and their locations during WW II.

The "Konsortium" Agreement is described and analysed in some detail. The aim of it was the promotion, marketing and licensing of the Schertel-Sachsenberg-System and its further development. Both partners had equal rights and designated their patents to the Konsortium.

A later chapter addresses in great detail the boats built at the Gebr. Sachsenberg shipyards in Rosslau and in Hamburg.

Design details and reports of sea trials are provided. Most of the boats were for military use and for different assignments in the Navy. The largest boat, the VS 8, was for 20 years the largest hydrofoil boat built. There are two impressive tables that list all the boats that were constructed or were under development until end of WW II.

Mr. Sachsenberg (Son of Gotthard Sachsenberg) describes herein the situation in Germany after WW II in the West as well as in the Soviet Zone and the status of the Sachsenberg Shipyards which were all fully destroyed.

Unlike the Russians, the British and American authorities showed little interest in the WW II development.. They saw a great future in it and they founded the KBR Rosslau (Design Office Rosslau) where they concentrated those experts who they could get hold of in their part of Germany. At the end of 1948 the KBR was closed down and all the know-how that was compiled by the German ex-

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perts was transferred to the Soviet Union. In no other country were so many hydrofoil boats built than in the Soviet Union mainly for testing.

In the West von Schertel and Sachsenberg came together again and the first post-war hydrofoil the PT 30 later named "Freccia d' Oro" was built with some Swiss financial resources on a small boatyard on Lake Lucerne.

On May 29, 1952 SUPRAMAR AG was founded by the Schertel-Sachsenberg-Consortium and a small Swiss bank.

After thorough testing on Lake of Lucerne the PT 30 was transferred to the Lake Maggiore and put into regular service on that lake between Switzerland and Italy. This was when Carlo Rodriquez saw the boat and got interested and the first License contract was signed between SUPRAMAR AG and Cantieri Navale Leopoldo Rodriquez in Messina.

The first PT 20 was built at that yard and after extensive testing it was put into scheduled service between Messina and the Italian mainland. It was the first hydrofoil vessel classed by a classification society.

In 1958/59 the "ice was broken" and a number of ship owners placed orders with the Rodriquez shipyard. The next bigger model, the PT 50, was launched and numerous orders were realized.

Also at the time SUPRAMAR AG was founded, another company the NAUTIK GmbH was established in Germany with some German partners to enhance the activities in Germany.

As earlier mentioned the Soviet Union, and especially the Soviet Navy, had great interest in the hydrofoil technology and the "KBR" was established to collect and catalogue all data and information on this subject. A number of ex-Sachsenberg engineers and scientists were employed to fulfill this task. Also some prototypes were built. As mentioned earlier the "KBR" was eventually closed in 1948, the Soviets had all they needed to carry on their own development "at home".

The Deutsche Democratic Republic (DDR) took up the hydrofoil development in the 1950s for civil as well as for military application. The Navy intended to use hydrofoils as fast attack-craft in the Baltic Sea.

The first hydrofoil boat in West Germany was ordered by the Hessian Water Police from NAUTIK GmbH and delivered in 1955. It was of course of the Schertel-Sachsenberg- System. This 10 m POT 3 named type was quite successful in its service on the River Rhine and repeat orders were generated.

Worthwhile to mention is also a 14 m boat for the "Forces Francaises en Allemagne". This boat was built on a small shipyard at the Lake of Constance. Many details of this boat are given in the book.

In 1952 the NAUTIK GmbH negotiated with the Government of Bremen a contract for passenger hydrofoil very similar to the PT 20 of SUPRAMAR AG. After long negotiations and fund raising procedures it was finally built by the LÜRSSEN Shipyard and it was called PT 21 in order to avoid confusion with the PT 20 of SUPRAMAR. Because of lack of suitable diesel engines for the twin propulsion arrangement, gasoline engines had to be used. The foils were retractable which actually complicated the system quite significantly It was a very advanced craft (may be too advanced for that time) and it was never really used in scheduled passenger service mainly because of the gasoline engines. When Daimler Benz could finally deliver suitable diesel engines, a re-engining of the boat was considered to be too expensive. No customer could be found and after some years of sales efforts the "BREMER PIONIER" was finally scrapped in the early 1960s.

The book pays tribute to Jean N Logothetopoulos or "LOGOS" because his full name was much to complicated. Born in 1914 in Hamburg he studied at the Technical High School in Berlin together with Prof. Schuster. In the early 1940s he made acquaintance with Gotthard Sachsenberg and became engaged in hydrofoils. He was part of the "HYDROFOIL TEAM" and, tending more towards the practical work took part in the testing of all boats built during WW 2. He died in 2003. He gave also many valuable inputs to this book.

The authors briefly mention the new developments by SUPRAMAR AG from the 1960s onwards and other developments as foil cats, Boeing Jetfoil and others. They recommend that the years after 1960 should be addressed in some depth in a follow-up publication regarding the development of High-Speed-Vessel to complete the issue.

The book is rich photos of the boats and other memorabilia, and contains biographies of many of the personalities mentioned in the book along with their photos.

SAILOR'S PAGE

BLOWING YOUR BOAT SHOES OFF

By Tom Haman (IHS Member)

[Extracted from "Soundings" July 2007 by permission]

A handful of folks have been working on hydrofoil sailboats for years. One of them is Sam Bradfield who, with his team at HydroSail, is developing a performance flying foiler for around-the-buoys racing. Others are George and Joddy Chapman, who have been working on a catfoiler in England, and designers in Australia are developing the Moth Class, which encourages its members to build dinghy-size 11-foot tandem foil racers.

Hobie Trifoiler Underway

We also have seen efforts to develop larger foilers, - for example, SCAT from HydroSail, a 37-footer, and I'Hydroptere, the French 60-footer, both full-flying foilers. The offshore 60-foot class is slowly adopting foils, some putting Bruce foils on amas and a foil on the rudder, all for better stability. Others are testing flying foils.

The challenges of developing a marketable everyman hydrofoil sailor are many. One of the biggest is finding a small, manageable, strong, lightweight platform that is safe for the skipper. The WindRider Rave and the Hobie Trifoiler addressed this by incorporating a cockpit into the design. One disadvantage of this solution: Though it keeps, crew safe in their seat, it doesn't allow weight shifts for maximum righting moment.

As these boats have progressed, building materials have gotten better. With carbon fiber it's now possible to build them at competitive weights. This has been important in advancing the state of the art. For the future, we can expect hydrofoil sailors to routinely exceed 30 knots and race at twice wind speed. They will match speed with high performance multi-hulls upwind and downwind, and foil away from them on a reach. Hydrofoils powered by kites 500 feet in the air may offer new levels of performance and leave rivals in their wakes.

There are new and used hydrofoils on the market: HydroSail (321) 723-0733, WindRider Raves (used only), and Hobie Trifoilers (currently used only). Try foiling. It will blow your boat shoes off.

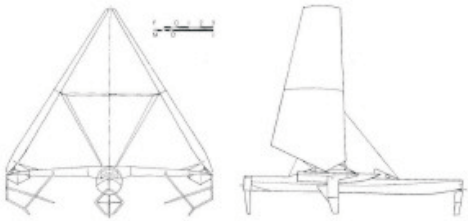
The Hobie Trifoiler is out of production, but it can be found used, along with new and used foilers from other manufacturers.

NOTE: Tom Haman is a partner in HydroSail LLC, of Melbourne, Fla., and a longtime foiler.

MORE TANDEM SAIL HYDROFOIL CONCEPTS FROM THE PAST

In the Second Quarter 2007 IHS Newsletter, we featured an item concerning a hydrofoil sailing trimaran design by the Leningrad Ship Design Centre based on the conversion of a Kometa passenger hydrofoil which appeared in at least the 1985 and 1986 issues of *Jane's Surface Skimmers*. The craft was never built as far as we are aware.

More recently a smaller sailing hydrofoil proposal with a quite similar tandem inclined sail arrangement as the Kometa derived design came to our attention. The design was outlined in an article by its designer, R.E. Vincent, titled: "Beware Low Flying Boats - An Experimental Hydrofoil Craft with an Ingenious Theory for Stability" which appeared in the May 1972 (Vol. 124, No. 2758) issue of *Yachting World* (pp 98-99).



R.E. Vincent Sketch of Experimental Hydrofoil

Given the *Yachting World* article pre-dates the appearance of the Leningrad Ship Design Centre concept published in *Jane's* by about a decade, perhaps the study by R.E. Vincent inspired their further investigations? A summary of the article follows:

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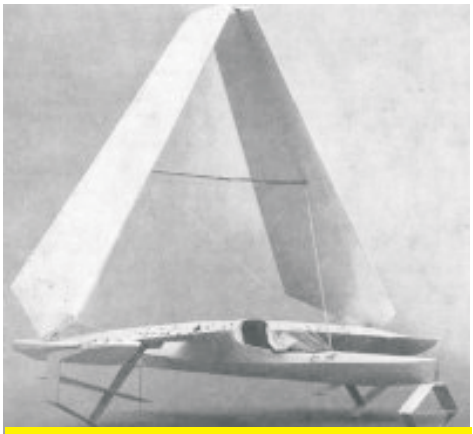
MORE TANDEM SAIL CONCEPTS
(Continued From Previous Page)

Design Objective

The objective was to find a configuration suitable for a sea-going machine, the initial design being for a



Tandem Sail Hydrofoil Proposal by R.E. Vincent

single-handed prototype to evaluate the proposed sail and foil geometry. The critical requirements for the design included the need for adequate transverse, longitudinal and directional stability in both the foilborne and hullborne states.

Sail Design

At high speeds it was found that the apparent wind angle relative to the course of the boat remains small, regardless of the sailing direction. For instance, if a boat sails at 3x true wind speed, the apparent wind angle never increases significantly above 18 degrees from ahead. To achieve the necessary driving force, the sail must operate at a low angle of incidence to this apparent wind.

The low apparent wind angle also necessitated a configuration with a high lift to drag ratio where a solid wing section was assessed to be superior to a conventional sail.

Transverse Stability

Analysis suggested that side thrust may be approximate equivalent to the weight of the boat. If the boat weighs 500 lb, then side thrust may be up to 500 lb f. With such a large side force, means of stabilizing the boat would be necessary.

Additional ballast of any kind especially a ballasted keel would penalize a hydrofoil boat due to this extra weight. The application of shifting ballast, for example, moving crew weight was also considered unrealistic for a seagoing boat. The use of down thrust on the windward foil to provide stability was considered to not be altogether safe. Such a foil would require constant trimming, and if it lifted out of the water, the craft could capsize rapidly.

The solution was to achieve dynamic equilibrium through the sail arrangement. The solution was to employ two wings canted together so that the base of each is at the extreme of the lateral beam and the tips of the wings join together. The whole system achieving a strong triangular form, a bonus in light of the high loads exerted on the sails. The system develops downthrust on the windward wing and upthrust on the leeward wing, the resultant moment counteracting the overturning side-force.

Longitudinal And Directional Stability

The forward thrust of the wing system creates a bow depressing moment. The solution was found in the positioning of the wings for-and-aft and in the creation of adequate upthrust about the bow; again the high loading factor was critical.

Achieving a suitable foil arrangement was complex. It was easy enough to design a bow foil to provide the necessary lift, but this interrupted the directional stability of the boat. Also a bow steering foil could create directional instability. The solution was achieved by designing a foil which can pivot about a vertical axis and follow the water flow with a castor action.

Likewise for directional stability, the main foils had to be near the centre of effort of the wing system. To achieve the desired lift distribution it was convenient to have the main foil pair close to the centre of gravity, and for longitudinal stability an adequate length of foil base was required. These problems were solved by mounting the main foils to the transverse beam which supports the wing sails. This beam could be moved fore and aft to optimize all conditions. Another is that the wing sail thrust is transmitted directly into the main foils, reducing stress elsewhere in the structure.

With the centre of lateral resistance (main foils) near the centre of effort (wings) and no directional influence from the bow foil, a steering surface was positioned aft to attain positive directional stability.

Possible Future Developments

Thoughts for later development flowed from the development of this design, and included the possibilities of: Vertical take off or Ground effect wind-powered machines.*

* Editors note: This is an interesting forecast from almost 35 years ago. In a forthcoming Newsletter, we intend to review a current speed sailing design project that closely matches the latter description.

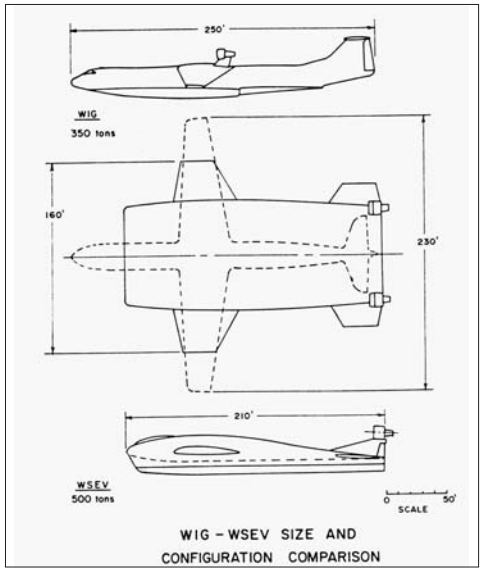
WELCOME NEW MEMBERS
(Continued From Page 2)

meeting defense requirements for mobility, mission capability, efficiency and environmental compliance. Having just retired as a Navy Captain after 26 years, Mike was an Engineering Duty Officer, engaged in design, construction and life cycle support of ships and ship systems. This included managing a complete overhaul of one of the Navy's hydrofoils, USS Aquila (PHM-4), and writing a technical paper on methods of non-destructive testing for PHM struts and foils. Most recently Mike was Navy Program Manager for CVN 21, Future Aircraft Carriers. He has a BS in Electrical Engineering from University of Pennsylvania and an MS in Electrical Engineering from the Naval Postgraduate School.

WINGED SURFACE EFFECT VEHICLE

IHS has received a long letter from Richard Greer (IHS Member) and founder of Water Research Co., in which he referred to an article in the First Quarter 2007 Newsletter about the WIGH Passenger Hydrofoil.

It so happened that back in the early 1970s, Richard and a colleague by the name of John H. McMasters had been working on what was then considered a new Winged Surface Effect Vehicle. They combined an SES with a wing as illustrated here.



WIG – WSEV SIZE AND CONFIGURATION COMPARISON

The concept was reported in a paper in the ASNE Naval Engineers Journal, April 1974. It also appeared in "Jane's Surface Skimmers" of 1975-76. Richard also sent a copy of a patent 3,768,429: Watercraft, describing the concept. He built a small test model of the concept about that time with which he experimented with varying degrees of success.

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

ROBERT LEON STEVENSON REMEMBERED

Robert Stevenson, (IHS Member) 76, of Bow, Washington, died December 10, 2007 at Coos Bay, Oregon. He was born, August 1, 1931, in Los Angeles, CA. He was raised in Rogue River, and owned Fire-View Products in Rogue River, until retiring in 1990, when he moved to Bow. In Bow, he designed and fabricated aluminum boats, including a hydrofoil. He is survived by, his wife, Katherine Stevenson, of Bow; daughters Gianaclis Caldwell and Carol Stevenson; stepdaughter June Fryer of Grants Pass; and step-son John Southern of Nampa, Idaho; and 10 grandchildren.


30 Ft. Trimaran With Foils


View of Foils - July 2003

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EXTRA FOR THE WEBSITE EDITION

BROOMSTICK

ONE-PERSON HYDROFOIL TRIMARAN PROJECT

PROGRESS REPORT

Doug Halsey (IHS Member)
Photos by Terry Curtiss

BROOMSTICK is the name of the hydrofoil trimaran that I designed and built and that I sail on the inland lakes of Southern California (Lake Perris and Lake Elsinore). I have always felt that hydrofoils were a magical sort of thing, and since my wife and I have owned a number of dogs with names like Goblin, Wizard, and Impy, the name *BROOMSTICK* seems to fit into the family nicely.

My intention in building the boat was to produce something that would challenge my engineering capabilities, be fun and exciting to sail, and be near the upper limit of what would be possible for one man (of my age and size) to transport, rig, and sail by himself. I'm not aiming for any speed records or competing for any prestigious trophies with this boat, but I hope to learn enough to be able to dream about such things for a possible second boat.

Only conventional materials have been used in this project. The main hull is planked of foam, and covered inside and out with fiberglass/epoxy. The amas (pontoons) are plywood. The crossbeam assembly is welded aluminum tubing with fabric trampolines. Masts and booms are aluminum. The sails are Dacron. Some of the parts are over 30 years old, from an earlier boat. The foils are all softwood, covered with glass/epoxy. There's no need to spend a fortune at this stage.

***BROOMSTICK* - a 15' long, 17' wide, one-person trimaran that can be set up in a variety of ways - shown sailing on foils using its larger rig and its smaller amas. Lake Perris, June 4, 2007. (Photo by Terry Curtiss)**

BROOMSTICK is by no means a finished product; rather it is a continually-evolving experimental platform. As such, the hulls, rigs, and foils are highly modular and easily interchangable. I have sailed it both with and without foils, with 2 different sets of amas (pontoons), 2 different rigs, but so far, with only the initial set of foils.

The foils are arranged in the so-called "airplane configuration", with 2 deep-vee, high-dihedral surface-piercing foils just forward of the center of gravity and a smaller horizontal foil at the bottom of the rudder. This configuration was chosen for its simplicity, rigidity, and stability.

Over the years, the question of whether to use surface-piercing foils or fully-submerged foils has been a hotly debated topic, with each side claiming numerous advantages. I think that the recent successes of *l'Hydroptere* (surface-piercing) and the Moth class (fully-submerged) show that both types can be equally successful.

I believe that either type of foil could be used on *BROOMSTICK*, but I chose the surface-piercing option for the initial foils because they are much simpler for the amateur to build. There are no flaps, no wands, no moving parts on the main foils. Main foil incidence is set by bolting to brackets, and is not normally changed on any given day.

I have provided manual incidence control for the aft foil (by simply adjusting the angle of the kick-up rudder), so that I can try to sail with close to the optimum amount of foil in the water for the given conditions, rather than just accepting the variation of foil area with speed that surface-piercing foils automatically provide.

Vee foils are used for the main foils instead of the more common cantilevered foils because of the structural rigidity of the nearly triangular shape. This allows them to be made of light wood

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BROOMSTICK
(Continued From Previous Page)

covered by a single layer of 9-ounce fiberglass, with no carbon fiber reinforcing, even though their chord is smaller than it might be for cantilevered foils. Furthermore, for a given foil depth, the span (horizontal projection) is twice that of cantilevered foils.

Initially, I was worried about extra induced drag that might arise for vee foils with combined lift and side force, but numerical experiments in a vortex-lattice lifting-surface code convinced me that vee foils are actually quite efficient, especially when a short vertical fin is added at the bottom of the vee.

The large dihedral angle was chosen to discourage ventilation of the foils, to improve performance in conditions with large side forces, and to allow the boat to fly sufficiently high above the water with the desired foil span. It also provides exceptional stability in pitch.

Broomstick on its trailer, ready for its first sail. Any boat this wide must be dismantled for towing and storage. Each component is light enough to be carried easily by one person. Fallbrook, June 24, 2003. (Photo by Doug Halsey)

The main foils were initially provided with anti-ventilation fences at 6" increments along both inboard and outboard segments of each foil. I removed them after observing flow separation originating from them on a number of occasions. The boat sails much better without them.

The boat is assembled and rigged on the beach or at the water's edge. It must be anchored in deeper water to deploy the foils. The visible scars on the foil surfaces are the result of removing the anti-ventilation fences. Lake Elsinore, August 24, 2006. (Photo by Terry Curtiss)

The boat was first launched in June, 2003 and sailed as a conventional trimaran for the rest of that year, using the longer amas, a daggerboard, and the smaller rig. It performed reasonably well in this mode, for a boat of this size, but was somewhat hampered by design compromises made with the foils in mind (small ama volume, low crossbeam clearance, etc.).

By early in the next year, I had completed the foils. Broomstick flew successfully on its third outing (May 10, 2004), reaching an estimated speed of about 18 knots and fulfilling a dream that I had had for many years. Shortly after that, however, a serious illness in the family was diagnosed, and I was not able to find time to sail for almost 1 and 1/2 years. During that time, though, I was able to build the smaller set of amas and put together the larger rig.

At this point in time (October, 2007), I have more time to devote to the project, but have still only sailed with the foils a total of about 20 times. Several of these days had too little wind, and there

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BROOMSTICK
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were problems with the main-foil attachments and the aft-foil controls on several of the other days. I am gradually overcoming these problems and the boat's performance is improving steadily.

This year, I have been using a Velocitek S10 (GPS speedometer) to log performance data (speed, heading, etc.) and, on several outings, I have been accompanied by a friend and professional photographer (Terry Curtiss), who has taken literally hundreds of photos each day. Synchronizing the clocks on the camera and the Velocitek S10 helps me determine not just how fast the boat was going at any instant, but also how the boat was set up, how high and at what pitch and heel angles it was flying, and much other useful information.

At sub-foiling speeds (semi-displacement mode), the foils partially lift the main hull and provide enough righting moment to keep the amas out of the water. The boat can be very fast in this mode. There is no sudden change when the main hull totally clears the water. Lake Perris, June 4, 2007. (Photo by Terry Curtiss)

BROOMSTICK PRINCIPAL DIMENSIONS

Overall Length	15 feet (Main Hull)
Length of Amas	11 feet (Longer Set)
	7 feet (Shorter Set)
Overall Beam	
	17 feet (Between Ends of the Cross Beams)
	13 feet - 8 inches (Between Vertices of the Vee Foils)
Total Sail Area	
	108 sq. ft. (Smaller Rig)
	140 sq. ft. (Larger Rig)
Total Weight	
	200 lbs (Without Crew)
	350 lbs (With Crew)
Main Foils	
Dihedral	60 degrees
Chord	6 inches
Span	22.5 inches (Horizontal Projection at Bottom of Hull)
Depth	19.5 inches (Below Bottom of Hull)
Section	NACA 0012 (Approximately)
Fin at Bottom of Main Foils	
Chord	6 inches
Span	6 inches
Aft Foil	
Chord	6 inches
Span	24 inches

Top speed measured so far on a reach is 20.6 knots, with a best 10-second average of 20.2 knots. I am more uncertain about performance to windward at this stage, but I believe the boat has exceeded the true wind speed at a heading of about 60 degrees from the true wind.

The performance described above was achieved in winds of about 15 knots, using the larger rig. I expect (and hope) to achieve much higher speeds in stronger winds, probably using the smaller rig. I would like at least to exceed half the current World Speed Record.

Any major improvements in reaching speed and windward ability (in the windier conditions that I am most interested in) probably will require significant reductions in aerodynamic drag and increases in righting moment. My Velocity Prediction Code (VPP) indicates that

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BROOMSTICK
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reductions in drag of the foils would be of less importance, at this point.

Possible aerodynamic improvements might include:

- Reducing parasite drag (streamlined crossbeams, internal halyards, more attention to detail, etc.)
- Eliminating the amas. This may be feasible on reaching legs (in speed trials, for example), but I wouldn't want to try it on windward legs
- Adopting a more modern conventional rig (square-top sail, carbon-fiber mast, newer sail materials, etc.)
- Adopting a more radical rig, possibly a large-chord wing mast. Full-chord wing sails are ruled out by my desire to focus on the foils, to keep expenses down, and to be able to rig and unrig it myself

Righting moment is a key factor in the design of any high-speed sailboat. Broomstick obtains its righting moment in a conventional way:

- Crew weight is positioned far out to windward
- Heeling increases the area (and hence lift) of the leeward foil and decreases the area of the windward foil

Possible increases in righting moment might include:

- Using a trapeze to move the crew weight farther to windward. This will require me to improve my sailing technique, since I already feel like I have too many lines and too few hands

Continued on Next Page

Sailing with the smaller rig. The wishboom rig imparts lower bending forces to the main hull and makes it easier to get under the sail when tacking and jibing, but jib luff-tension is not adequate. A newer version of this rig, to be completed soon, will have the mast extended and will use a conventional boom. Lake Elsinore, August 1, 2006.(Photo by Terry Curtiss)

Broomstick at close to 20 knots (in spite of dangling lines and poor jib trim). Lake Perris, July 12, 2007. (Photo by Terry Curtiss)

BROOMSTICK
(Continued From Previous Page)

- Adding a second crew. This may be beneficial in stronger winds (though cramped), but would seriously limit the foiling possibilities should the wind drop

- Allowing the crossbeam assembly to twist, so that the windward foil can generate some negative lift. I believe that I can arrange things so that this happens automatically, when needed, without any active input while sailing

- Setting the windward foil at a negative incidence, by manual means, to produce negative lift. This could be done most easily in speed trials, where the boat only has to sail well on one tack

Of course, increased righting moment means higher loads on the structure. Until I get more experience sailing on the foils and more confidence in the structure, I am reluctant to use any of these methods to increase righting moment. I am already breaking too many things!

I would never claim that hydrofoils are the perfect kind of boats for everyone (there are way too many practical problems), or that Broomstick is the perfect hydrofoil sailboat (several others are currently performing much better). I hope to be able to report on significant increases in performance in the near future, but for me, with my own interests, capabilities, and limitations, this has already been the perfect project.

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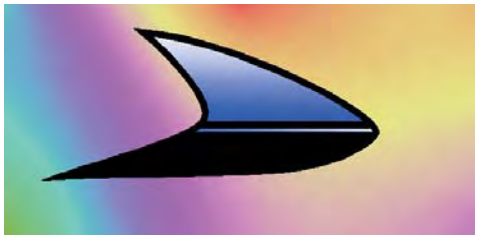

(Above) **It is obviously possible to capsize *BROOMSTICK*. This happened the first time out with the larger rig and the smaller amas. The winds were the strongest I've sailed in yet (estimated at 25 knots). I was just luffing and trying to untangle some lines, when a gust hit and over I went. At low speeds, the foils do not provide much righting moment, so the boat is especially vulnerable. Fortunately, it is very easy to right, even without outside help. The small amas displace only a fraction of the boat's weight, so it floats with the main hull in the water, rather than 8' up, and the mast lies parallel to the surface, with no tendency for the boat to turn turtle. Windage of the ama and trampoline act as a weathervane, causing the boat to rotate into the wind within a couple of minutes, at which point, my weight is sufficient to right the boat. Lake Perris, November 15, 2005. (Photo by Terry Curtiss)**

(Below) **No serious crashes have occurred while the boat was foiling. This minor crash was caused by a slipped or bent main foil attachment. The foil brackets & crossbeam tubes are not very streamlined, so they stop the boat very quickly when they hit the water (even at very low speeds). Lake Perris, June 4, 2007. (Photo by Terry Curtiss)**

BROOMSTICK
(Continued From Previous Page)

The incidence of the aft foil has been controlled by an up/down control wire for the rudder blade. This is what happens when the wire breaks and the rudder kicks up all the way. Later, a similar incident cracked the rudder & tore off the aft foil. A redesigned rudder and aft-foil control system is nearing completion at this time. Lake Perris, June 20, 2007. (Photo by Terry Curtiss)

(Below) IHS is grateful to Yoichi Takahashi, who is an active and regular BBS participant in the Models section. Below are photos of his most recent R/C hydrofoil model. It is a 1:40 replica of CALCIHAS, a Boeing 929-115 Jetfoil plying the waters of Hong Kong for the Turbojet Co. The model can be seen in action at http://www.youtube.com/profile?user=gasturvin

HIGH FLYER
(By David 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 IHS members would be interested in a crude hydrofoil I built in Grammar School in 1972 - 1973 after reading an article in *Yachts and Yachting* by James Grogono (Icarus). It was mostly built of scavanged 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 I could not afford the drag of rudders, etc. Next time I will know differently. It towed to full foils at less than 5 knots (the speedo on the power baot didn't register). In the photo it is out running a Boston Whaler at full throttle. 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 odd years later it might well be time to do Mark 2! *[Have you visited the IHS BBS lately? This is a typical posting. Please visit early and often! Get there from www.foils.org - Editor]*

The NEWSLETTER

International Hydrofoil Society

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

Editor: John R. Meyer | Second Quarter 2008 | Sailing Editor: Martin Grimm

USTICA LINES FLEET CONTINUES TO GROW

From Fast Ferry International, November 2007

The growth of Ustica Lines during the past decade has been spectacular. Established in 1993, the company operated its first services the following summer on two very long routes, Naples-Ustica-Favignana-Trapani and Trapani-Pantelleria-Kelibla (Tunisia), with a Rodriquez RHS 160F hydrofoil leased from SNAV.

Two years later, Ustica Lines acquired its first vessel, Rodriquez RHS 140 *Spargi*, to operate a subsidized service between Lampedusa and Linosa. Services between Trapani and the Egadi Islands were introduced in 1996, when two Rodriquez RHS 160s were purchased and the company also took delivery of its first new construction, a Rodriquez Foilmaster hydrofoil.

A move into construction came in 1997 with Ustica Lines' purchase of a 33% holding in Rodriquez Cantieri Navali. The shares were subsequently sold in 2000 and 2004.

Rodriquez Foilmaster Hydrofoil *Ettore M*, One of Six Operated by Ustica Lines

See Ustica Lines, Page 3

SUSTAINING MEMBERS

YOUR 2008 IHS DUES ARE DUE

See Full Announcement on Page 2

INSIDE THIS ISSUE

PRESIDENT'S COLUMN

To All IHS Members

Since the close of 2007, we have had 10 new members added to the Society's roles. This is a fairly good number, but I would like to see more additions. So …. All members are asked to encourage your colleagues to join.

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.

Please remember, you can view the Membership List (a new one was generated in January, 2008) 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). Please check the information on the List. If it is incorrect, send changes to: Steve Chorney: schorney@comcast.net

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 on April 1. The subject was "Large Trimaran Concepts and Technology Elements" Dr. Igor Mizine, Technical Lead & Senior Manager for Special Projects, Computer Sciences Corp. - Advanced Marine Center. Dr, Mizine discussed some of the key High Speed Trimaran technology findings and focused on the latest Heavy Air Lift Support Ship (HALSS) development as an alternative concept to complement Seabasing as well as potential for US Army Advanced Afloat Forward Staging Base missions. It is planned that a copy of the presentation will appear on the IHS website, so be on the lookout for it.

During this past Quarter, High Caliber Solutions had started work on putting together the opening for the Newsite, mentioned in the last Newsletter. However, personnel changes at HCS has brought progress to a halt. HCS has promised that there will be someone else assigned to the project soon. In the meantime several of the Committee members have prepared material for HCS to use as a basis for the site development. I will keep you informed.

Ray Vellinga, IHS Member, has written that we should go to the following site to see the video on HYSWAS: http://www.youtube.com/watch?v=wXB3fGMgvco The attempt was to inform, but to keep it light so as to attract wider attention than only engineers. He also got busy and posted "Foilborne". It was necessary to cut the length to 10 minutes due to Youtube restrictions. Might not be so bad, though. The average viewer will have a short attention span. Go to: http://www.youtube.com/watch?y=6SRxgbHsHdQ

John Meyer, President

WELCOME NEW MEMBERS

Donald L. Blount, P.E. – Don founded Donald L. Blount and Associates, Inc. (DLBA), a Naval Architecture and Marine Engineering design office in 1988. The company provides marine design, engineering, and consulting services for high-speed special-purpose commercial, military, and recreational craft for domestic and international clients. Noteworthy vessels include the 68m DESTRIERO, which holds the non-refueled Atlantic crossing record with an average speed of 53.1 knots and the 41m GT/MY FORTUNA for the King of Spain, having a speed of 68+ knots.

Don served as Head of the Department of the Navy's, Combatant Craft Engineering Department (CCED) for the last nine of his twenty years with that activity. He had been employed at the David Taylor Model basin for fifteen years prior coming to CCED. During his employment at David Taylor, Don conducted hydrodynamic propulsion tests for the PCH and AGEH as well as cavitation studies of combinations of intersecting strut, nacelle and hydrofoil geometry. In addition, he conducted towing tank tests to characterize surface piercing hydrofoils. He has co-authored and presented over forty papers and articles to various technical societies in the United States and other countries. Don has over 50 years of experience in the marine field, is registered as a professional engineer in two states and is a Fellow of both SNAME and RINA. He graduated from George Washington University in 1963 with a Bachelor's degree in mechanical engineering.

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USTICA LINES
(Continued From Page 1)

In 1999, a second Foilmaster entered service. Subsidized services between Marsala and the Egadi Islands were introduced in 2000 and two Rodriquez RHS 160Fs were added to the fleet.

Ustica Lines' first catamarans, two Kvaerner Fjellstrand Flying Cat 40m vessels, arrived in Trapani in 2001 and a third Foilmaster entered service. The following year, two more Flying Cats were purchased and at the end of 2002, the company started operating subsidized services from Trapani to the Egadi Islands and Pantelleria.

Four more fast ferries, two Kvaerner Fjellstrand Flying Cat 40m catamarans, a Foilmaster hydrofoil and a WaveMaster 38m monohull, entered service in 2003 and at the end of that year, subsidized services to the Pelagie Islands were introduced.

In 2004, Ustica Lines sold RHS 140 *Spari* to another Sicilian operator, who also leased one of the RHS 160s for the summer. However, five more RHS 160Fs, two Kvaerner Fjellstrand Flying Cat 40m catamarans and one Fjellstrand 38.8m catamaran were transferred to Ustica Lines when it purchased the SNAV vessels operating in the Eolie Islands and took over the company's contract with Regionale Sicilia.

Another Kvaerner Fjellstrand Flying Cat 40m was purchased, from an Albanian operator, in 2005, when the former SNAV fleet was refitted. Two vessels were re-engined and diesels in the others were overhauled. Two more vessels were acquired in 2006, a Rodriquez Foilmaster and an Austal Auto Express 48 catamaran, Ustica Lines' first fast ferry fitted out to carry both passengers and cars.

Ustica Lines' acquisition of SNAVs Sicily services in May 2004 had a dramatic impact on the company's passenger figures and annual income. The number of passengers increased to 1,552,320 in 2005 and 1,576,240 in 2006, annual income increased to Euros28,786,000 in 2005 and Euros34,133,000 in 2006.

In 2007 another Rodriquez Foilmaster, *Gigliola M,* has entered service and a Paradis Nautica Austal 42m catamaran has been both bought and sold. The acquisition of the catamaran, from Tide Sjo, was speculative and the vessel was sold to an operator in Spain during its delivery voyage from Norway.

In July 2007, Ustica Lines returned to Tunisia with a fast ferry service. For two months, three return crossings were operated each week between Mazara del Vallo, Pantelleria and Sousse.

Ustica Lines currently owns 25 fast ferries, the largest fleet in the European Union. Thirteen have been built since 1996 to IMO HSC requirements, the largest number in any EU operator's fleet.

Before the purchase of the eight vessels from SNAV, Ustica Lines' fleet comprised five DSC hydrofoils and nine HSC vessels that had an average age of less than 3.5 years.

The company has since introduced two more Foilmasters as well as the Albanian Kvaerner Fjelistrand Flying Cat 40m and the Austal Auto Express 48, which were built in 2001 and 1998 respectively.

Although the six Foilmasters and single WaveMaster 38m monohull are the only newbuildings introduced to date by Ustica Lines, five of the Flying Cat 40m catamarans acquired from other operators are HSC vessels and had an average age of less than six years when they entered service in Sicily.

Not all Ustica Lines' services have been based in Sicily. In the summer of 2001, the company established a joint venture, Trieste Lines, and transferred one of its RHS 160s to the northern Adriatic to operate between Croatia and Italy.

Ustica Lines Fast Ferry Fleet consists of:

Hydrofoils
7 Rodriquez RHS 160F
6 Rodriquez Foilmasters
2 Rodriquez RHS 160

Catamarans
7 Kvaerner Fjellstrand Flying Cat 40m
1 Fjellstrand 38.8m catamaran
1 Austal Auto Express 48

Monohull
1 WaveMaster 38m

Several other routes in Sicily have been operated on a trial basis and in July 2006, one of the Flying Cat 40m catamarans was briefly deployed to Cyprus, initially to evacuate foreign nationals from Beirut and then to operate a scheduled service between Larnaca and Beirut on behalf of the United Nations.

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MORE INCENTIVES WILL LAUNCH FAST CARGO CARRIERS

From Ferry Technology, December/January 2007/8

by Dag Pike

Viable designs are ready but the market still lacks inducement to commission such radical vessels.

Carrying cargo at high speed has always been a challenge. Weight and speed arc not happy partners and when the Japanese set out many years ago to develop their Techno-Superliner with the ability to carry 1,000 tonnes of cargo for 1,000 miles at 50 knots they maybe did not fully appreciate the obstacles. They finally came close to achieving their target in 2005 with their latest and largest version, an SES type of craft - Super Liner *Ogasawara* - but the economics did not match up, especially with today's sky-high fuel prices.

Now the technology for such a dream ship is possibly moving forward. The delivery of *Natchan Rera,* first of Incat's 112m wave-piercers, at least meets the 1,000 tonnes of cargo criteria, but the speed here is a more economic 40 knots. The ferry has 36MW of power provided by four MAN diesel engines, and this size of catamaran is claimed to have much better seakeeping than smaller versions. As far as cargo goes there is 450 lane metres of space for trucks.

Trimaran versions of fast ferries are serious challengers to big catamarans, and here the main focus comes from cargo-only craft where the trimaran seems to come into its own. Fast cargo is still a relatively new arena for high speed and with container ships now commonly achieving service speeds of 25 knots, the requirement for dedicated fast cargo has to find specialist routes.

One proposal in the USA is for large pentamaran vessels to operate on East Coast routes to relieve traffic problems on land. Here we are talking about a major step forward in size, with 300m-long hulls combined with a speed of 42 knots and deadweights of 6,500 tonnes. This Sea Bridge proposal (designed by BMT Nigel Gee) would require major investment and commitment but there are hopes of government funding to move the project along. In Norway, RollsRoyce has a fast monohull design and Aker Brevik its Steelcat, all ready to slot into the European Union's Motorways of the Sea vision.

In Europe there are new proposals for a cargo route from Norway to France with a focus on the transport of fish to Boulogne as the main cargo generator. Under consideration is the possibility of including Hull and Sheerness as British ports on the route but the aim is to provide a regular, reliable service that can overcome long miles of road travel and deliver cargoes at speeds that cannot be achieved by road.

BGV's 160 m Trimaran

For this project, the French design team of BGV - which can stand for Bureau Giles Vaton, alternatively for Batcau dc Grand Vitesse - has come up with the concept of a 160m trimaran design that would have 1,365 lane metres of cargo space for trucks, enough for up to 94 trailers.

This ship would have a range of 990 nautical miles so it almost meets the Japanese criteria but operational speed is only around 33 knots so it falls well short on that score. Nevertheless, this speed is adequate for overnight runs on the proposed route and a focus on economy as well as speed makes the operation viable.

300m Sea Bridge Pentamaran

The 300m Sea Bridge pentamaran could operate on US East Coast routes to relieve traffic problems on land.

To enhance this economy, the proposed BGV vessel, like the Sea Bridge and other plans, would operate on heavy fuel oil compatible engines. Clearly, it would need to burn low sulphur qualities to ensure com-

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FAST CARGO CARRIERS
(Continued From Previous Page)

pliance with the new SECAs in the English Channel and North Sea.

It is claimed that, by using heavy fuel oil, fuel costs can be reduced by up to 40 per cent compared with normal high or medium speed engines burning diesel oil. The power units proposed are two 21,600kW MAN medium speed models. These 18-cylinder units are heavy compared with the competition, but weight is not so critical with the displacement hull form of a trimaran. This design has a deadweight of 2,490 tonnes compared with 1,450 tonnes for the large Incat design. As with most fast ferry designs, propulsion would be by means of waterjets.

The BGV trimaran design has a long slim and efficient hull form, and above the waterline the center hull widens out to allow a two-deck stowage arrangement. This in turn allows a twin stern ramp layout for speedy turn-around times. The proposed construction is in high tensile steel. So here we have a design that uses steel construction, heavy fuel oil-burning engines and brings fast ferry design closer to conventional ship systems than the more exotic aluminium and higher speed engines of some of the competition.

When it comes to fast cargo there have been several proposals for vessels based mainly around trimaran design although both Austral and Incat have developed catamaran concepts. The several designs on the table for high-speed cargo certainly look viable, but it does seem that incentives - whether it is down to economics, politics or viable routes - for the launch of such services are still lacking.

FLIGHT OF THE AQUILA

By CAPT Michael Schwartz, USN (Ret), IHS Member, and RADM William Landay, USN

USS *Aquila* (PHM 4) was the fourth ship in the U.S. Navy's *Pegasus* class hydrofoil craft, commissioned in June 1982 and decommissioned in July 1993. The ship served with distinction, operating from her homeport at the Trumbo Point Annex, Naval Air Station, Key West, Florida. Some may remember that the ship was the center of one of the most interesting repair availabilities ever conducted, following an unlikely and devastating encounter with a whale on the high seas. The following is a brief historical account of that period, which would have the ship and her crew away from their homeport for the better part of a year.

Aquila displaced 255 tons fully loaded, with a length of 133 feet, and beam of 28 feet. Designed with an aluminum hull, the ship had retractable stainless steel struts and foils. The ship was capable of hullborne speeds of 12 knots, powered by 2 Mercedes-Benz marine diesel engines. Foilborne, the ship reached speeds greater than 40 knots, powered by a General Electric LM2500 gas turbine and a waterjet propulsor. Designed for high speed and mobility, the ships were a dream to operate in foilborne flight.

In the summer of 1992, while operating independently in foilborne flight, the ship struck a surfacing whale. The forward foil initially glanced off the whale, but the aft foil impacted directly, which caused a shock wave to ripple through the hull, and brought the ship crashing into the water. The titanium locking bolts for both port and starboard aft strut locks were sheared, causing the aft foil to swing up during the impact. This acted as a large sea anchor, causing both strut actuators to be ripped from the hull. The impact of these forces could be seen as bent longitudinal stiffeners between frames 25-33 and bent transverse frames at frames 26-27. Machinery was pulled out of alignment, as were the struts and foils. The abrupt stop resulted in several crew injuries, and left the ship motionless for hours, struggling to control damage and flooding in shark infested waters. Through the superb efforts of the *Aquila* crew in an all hands damage control effort, the ship was rapidly stabilized, the injured crewmembers treated and prepared for transfer off the ship and the ship slowly started back toward the rescue vessels that were enroute to assist.

The Supervisor of Shipbuilding, Conversion and Repair, Jacksonville, Florida was responsible for planning the repairs, and in consultation with the builder, Boeing Marine Systems, developed a repair package for the damaged hydrofoil. The contract for work was awarded to Jacksonville Shipyards Inc, in Jacksonville, Florida. The damaged vessel had to be drydocked in such a way that the struts and foils could be fully extended and retracted to verify critical alignments. To do this, a massive cribbing structure of concrete, steel and wood was erected on the quay wall atop a steel bed plate designed to distribute the weight. A derrick barge from Bisso Marine was brought in to lift the ship in its docking cradles, and place it atop the beefy cribbing structure. The structure itself not only had

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AQUILA
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to be sturdy enough to support the ship and the movement of the struts and foils, but had to be able to survive hurricane force winds.

The Drydocking Selected Restricted Availability (DSRA) began 21 October 1991, and was scheduled to complete 13 March 1992, though actual completion date was 8 May 1992. Critical work included replacement of damaged longitudinal and transverse stiffeners and hull plating, a thorough inspection and reassembly of the struts and foils, including control flaps, control linkages, galvanic isolation, trunnion pins, down locks and the bow doors. An engineering change to improve support of the foilborne propulsor was also accomplished. A particularly challenging aspect of the repair was the decision not to repair the twist in the hull aft of the trunnion pins caused by the forces of the collision, but rather to realign the gas turbine, propulsor and associated equipment to the existing hull shape.

The stainless steel struts and foils were designed for 770 hours of flight per year during a 15-year service life.

USS AQUILA - Photograph Used With Permission of Bisso Marine Co., Inc.

The design and fabrication strategy for the struts and foils was based on fatigue and flaw growth criteria, rather than those for static loads, so a comprehensive non-destructive test and inspection plan was developed to monitor the condition of components and critical welds. An internal inspection of critical welds was also prescribed, because designers expected weld failures to begin at the root of the weld and work their way outward.

The original struts and foils were operated without a paint system, which led to severe surface pitting. This condition was given a great deal of attention during the early years of operation, and was ultimately mitigated by applying a paint system. The DSRA on *Aquila* afforded the first opportunity to perform a complete inspection on strut and foil critical welds. In addition to ultrasonic testing (UT), x-rays were taken on the aft strut welds, where the majority of the UT indications were observed. The results showed signs of incomplete weld penetration during the fabrication process, but no signs of fatigue cracking. This conclusion was corroborated by a visual inspection of a section of fabrication weld cut out during repair of the damaged port strut. It was concluded that the struts and foils showed no signs of fatigue, and that further UT inspections could be used as part of a routine test and inspection program, to monitor for signs of fatigue. Critical to completion of the overhaul was optically verifying angle of incidence of the foils when compared to the hull.

Despite all of the challenges, the repair was a success and *Aquila* flew again during sea trials, which were conducted in the Jacksonville OPAREA 4-7 May 1992. The ship and crew returned once again to their homeport in Key West where they were active members of the Navy's hydrofoil squadron until its eventual decommissioning.

MAPC UPDATE

MAPC has renewed its Sustaining Membership in the IHS for 2008. MAPC President, Mark Rice, provided an update of the Company's activities.

Under IR&D, Maritime Applied Physics Corporation (MAPC) has designed and is currently building a 40-foot "Common Unmanned Surface Vessel" that has been purchased by the AAI Division of TEXTRON Corporation. Through a team that includes Caterpillar, Chesapeake Sciences, Raytheon, and AAI, MAPC hopes to offer the Navy a USV product that contains the lessons learned from its earlier Unmanned Sea Surface Vehicle (USSV) program and the six Small Business Innovative Research projects that the Company has received for Unmanned Surface Vehicle components.

MAPC is teamed with L-3 Corporation to pursue fleet transition of its 38-foot hybrid submersible under a SBIR contract. Also under an SBIR, they designed and are building 1/20th scale models of an aggregated

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MAPC UPDATE
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sealift ship that consists of four 500 foot segments for testing in the Naval Surface Warfare Center, Carderock Division basin. MAPC recently won a SBIR to develop a USV refueling system and are nearing completion on SBIRs for a towed influence sweep power supply for a USV, and a UAV launch and recovery system for a USV.

The Company continues production work on two DDG1000 projects and are proceeding with the production of the second watercraft launch and recovery system for the General Dynamics Littoral Combat Ship. MAPC is in discussions with two municipalities regarding the delivery of 149-passenger hydrofoils for commercial service. They recently completed initial testing of a 60' x 30' tethered aerostat that will be used to generate electricity from wind power. Under MAPC's land vehicles group, they have designed new offroad drivetrain components that they hope to offer commercially and have designed an aluminum very low ground pressure trailer for use on Alaska's North slope. Also, the Company continues work for Northrop Grumman on the VIRGINIA Class program. The transition of MAPC from an engineering company to a prototype company and to a company that now has five production programs has enabled the growth in staff and facilities to take on larger projects. MAPC's employee owned company has a strong backlog and is looking forward to maintaining its growth in the coming years. MAPC President, Mark Rice, hopes to make commercial hydrofoils a core part of this business growth.

DO YOU REMEMBER?

By John R. Meyer

How about **Sea Legs**? Some "ole timers" may have vivid memories of this little boat that set the US Navy on a new course. For the younger members of the IHS, they should know something about our heritage.

During the early 1950s, the naval architectural firm of Gibbs and Cox of New York had assembled with U. S. Navy support, a technical team for the design of a versatile hydrofoil test craft. It was built by Bath Iron Works and aptly named BIW. The craft, 20 feet long with a 5-foot beam, displaced about 1800 pounds and had a 22-hp outboard engine. BIW was successful in testing different foil arrangements, different control schemes including manual, mechanical and electronic, and different height sensors used in the control system. The most important outcome of this work was the potential for an electro-hydraulic autopilot and the decision to design and build SEA LEGS.

In 1954 Sutton and Browne undertook the modification of a Chris Craft hull. A foil system was added and propulsion system changes were made. An electronic autopilot stabilization system, developed by the Draper Laboratory at the Massachusetts Institute of Technology, was installed to control the fully-submerged foil system. This electronic autopilot contained 160 vacuum tubes! Remember them? A signal input to control the flying height of SEA LEGS was obtained from a bow-mounted sonic height

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RISING FUEL COSTS COULD GET THE NUCLEAR BALL ROLLING

From Ferry Technology. October/ November 2007
by Dag Pike

Going 'green' on a larger scale could pave the way for nuclear-fueled passenger ships, but who will be the owner brave enough to plunge for this option?

Increasing pressure is being placed on passenger ship operators of all sizes to become 'green'. Much has already been achieved: modern diesel engines offer minimum fuel consumptions and exhaust pollution; many ships today also have highly advanced waste treatment plants, and in some sectors the use of wind and solar power is being promoted. At the same time, research is well underway into the last taboo, a nuclear-powered passenger ship option.

Previously, hydrogen as a fuel was considered, and reports now circulate of another planned use of hydrogen on a passenger ship in Iceland. This involves the 130gt *Elding,* which is currently undergoing conversion at a reported cost of US$600,000. *Elding* is used mainly on whale watching expeditions, and the conversion will not only allow the ship to have a zero carbon footprint but the hydrogen will make for smoother running engines, so there will be less vibration to disturb wildlife.

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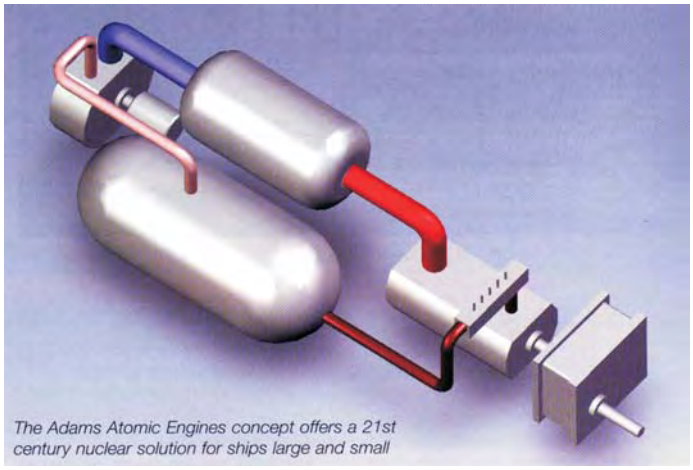
Interested in hydrofoil history, pioneers, photographs? Visit the history and photo gallery pages of the IHS website.
http://www.foils.org

NUCLEAR BALL ROLLING
(Continued From Previous Page)

Although much focus on 'green' technology is aimed at larger ships, attention is also being directed at the smaller end of the market. For example, the specification for the latest San Francisco ferries demands that at least one auxiliary generator is a fuel cell or similar green' machine.

A diesel-electric river cruise ship in the USA operating as a floating classroom on the Ohio River has also gone 'green'. Here the green factor is that its diesel-alternators operate on bio-fuels. Provision has been made to allow the future connection to the plant of solar panels, fuel cells and wind turbines.



The Adams Atomic Engines concept offers a 21st century nuclear solution for ships large and small

Adams Atomic Engine Concept

For larger passenger ships, the long-term future could well lie with atomic power. At least two projects under development are aimed at making this fuel a viable marine power source.

Nuclear power has been used for naval ships for many years, but they do not have to operate to normal economic standards. The US cargo (and nominally passenger) ship *Savannah* was the first civil vessel but was always heavily subsidized (the German Otto *Hahn* and Japan's Mutsu were others; Russian nuclear icebreakers have also been used on cruise voyages to the North Pole). Today, with fuel oil prices rising again, the era of the nuclear powered passenger ship could be moving closer.

In South Africa (and separately in The Netherlands under the Nereus project), the pebble bed modular reactor (PBMR) is being promoted as a compact power plant that could eventually become shipborne. PBMR is close to realising a commercial land generating system that could pave the way for a marine version.

The PBMR system uses helium gas to transfer heat from the reactor to drive a gas turbine. In the USA the Adams Atomic Engines system is being promoted as a potential power source for both large and small ships. This design uses a reactor cooled by nitrogen gas. This gas exits from the reactor in a heated state and is used to drive a gas turbine. Gas is cooled after leaving the turbine and passed once more through the reactor so that the whole system operates on a closed circuit.

This is claimed to be a proven concept, but interesting from a marine point of view is that the designers claim that units as small as 1,000kW can be viable and that larger versions up to 50MW are practical. This means that the whole spectrum of passenger-ship power requirements could be met.

Whilst the basic fuels required for a nuclear plant are increasing in price, they are not rising as rapidly as those for oil so fuel costs are likely to remain low. Adams Atomic Engines, which is proposing this concept, suggests that capital costs would not be much higher than comparable gas turbine machinery. This would have the advantage that, once working, an atomic ship would have no fuel costs for many years.

Weight saving would also be possible since no large oil fuel tanks would be needed, and Adams claims that nuclear ship economics are now becoming viable. In terms of a 'green' ship, there are no emissions to contend with, so this could be the ultimate 'green machine'. Nevertheless, the difficult question of spent fuel disposal remains, and the even more frightening potential for plant radiation leak - which is why nuclear powered ships sometimes meet with protestors in ports. The spent fuel aspect has been a problem for nuclear power stations on land but is scheduled to be solved before long, claims Adams.

From a technical point of view, the nuclear option looks to be feasible in the near future. The question is, who will be the ship owner brave enough to take the plunge? Almost certainly, any new nuclear-powered passenger ship will need government support and it would be unlikely - initially at least - that the ship would be engaged on international passenger trades.

YOUTUBE FOR HYDROFOILERS

By Ray Vellinga, IHS Member

Some of our members can be seen flying their hydrofoils in six new videos recently posted on Youtube. To see them, go to youtube.com and search for IHSIHS (unfortunately "IHS" was taken).

After doing the Youtube search you can view the fast flying OU-32 in rare footage provided by its creator, Kotaro Horiuchi. This incredible boat was built by Horiuchi-san when he was in charge of Yamaha Motor Company's Research and Development Department. It has a water jet and carries two riders at 40 mph. It balances on two struts and banks 45 degrees. If you purchase his book, "Locus of a Boat Designer", a DVD is included that shows more of his creations, and the book shows how he created them.

TALARIA IV, Harry Larson's famous flying 24' Bayliner, is shown levitating around Vashon Island, Washington. I took those photos while my wife tried to get our 28' water-bound Bayliner to catch up with Harry. The fully-submerged foils are roll controlled with an in-house designed autopilot. The height control uses a mechanical system, and soon Harry plans to unveil an improved autopilot that will control both roll and flying height.

Scott Smith's piloting skills and refurbishing talent stand out while he demonstrates his 1958 Dynafoil two person hydrofoil. Over 500 Dynafoils were built in Orange County, California, and only a small percentage of these are now accounted for. Scott was lucky to find this one and used his knowledge as a manufacturing engineer to breath new life into this marvelous machine. Also shown is footage of this hydrofoil runabout built by Grumman.

Human powered Hydrofoils are Dwight Filley's passion. He has designed and built one or two new models every year for the last ten years that we have been associated. Here in San Diego, we have a group of six like-minded hydrofoil aficionados.

Much of our time is spent at lunch talking about designing these fun machines, but as this video shows, we build and fly some as well. One of the current goals is to create a craft that can fly for long periods under the power of a weekend bicycle-riding athlete. Our mutual friend we call "Dr. Goodfoil" holds the informal record of 26 minutes continuous flight.

No demonstration of hydrofoils would be complete without at least one video of a surfboard that flies, at least in my opinion. At Youtube, IHSIHS, you get two. My High Flying Banana, AKA, Hifybe can be seen first struggling into the air and later flying smoothly. Like not judging a book by its cover, Hifybe is best judged by what is below the surface.

Over 15,000 web surfers viewed these videos in January and February, the early months on the web, and momentum is rapidly growing. There is a lot of public interest in hydrofoil boats.

If any members have raw video or film clips that they would like displayed on the internet, get them to me at: rvell@hotmail.com (put "hydrofoil" in the subject line) or send film, disk or cassette to me at 7910 Ivanhoe Avenue, Suite 5, La Jolla, CA 92037 and I will do the clipping, mixing and posting. Posting clips together will create a synergism stimulating public interest.

RUSSIAN VOLGA

By Jeffrey Phipps (IHS Member)

I am the proud owner of a Volga #109 I believe. I was driving down interstate 75 in Sarasota at dusk, and there in the bushes was a Russian hydrofoil!!! I stopped the pickup, backed up, went over the wall and into the bushes where the boat and trailer was lodged with minimal damage to the craft and a phone number on it. The guy on the other end of the line asked if I was the highway patrol and when I said I was just "interested" in hydrofoils he asked "do you want that @%#&&#$*^ thing". I paid him more than his original estimate, it was owned by a Swedish guy, and this fellow was just running it between the paint shop and the trailer shop. I went to Barrys' trailers in Sarasota. Five grand brought it here to Tallahassee and a mechanic did a beautiful overhaul of the upholstery, dash, lower end, engine.

Luckily, I know that there are two happy days in a boat owners life, so I keep it in a shed with a cover over her and just work instead. Her name is *Kite Ship* after a company I was involved with which created the outleader kite for sailing, a la sky sails that is now pulling ships out of Europe. My next project along these lines is to fashion a hydrofoil that I can use my gymballed keel kite mast on and go very fast, but that is for another day.

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SAILOR'S PAGE

THE ULTIMATE SAILING CRAFT - A WING BORNE HYDROFOIL (WBHF)

A number of years ago we presented some of the history of speed sailing in the IHS Newsletter including a brief review of some of the hydrofoil sailing craft which had achieved sailing speed records.

There is renewed interest in breaking the outright speed sailing record, which is currently held by Finian Maynard who achieved 48.7 knots on his wind surfer in April 2005.

At least three speed sailing projects are at various stages of development or trials in Australia. One such project is the Wing Borne Hydrofoil (WBHF) conceptualised and developed theoretically by Mr. Stephen Bourn, a mathematician and scientist with the Defence Science and Technology Organisation in Adelaide, Australia.

Although radio control model testing of the concept had already been undertaken previously, work commenced in 2007 on the detailed design and manufacture of a full scale prototype of a WBHF to Stephen's design as a mechanical engineering undergraduate student project at the University of Adelaide. This will be ongoing in 2008. Supervisors for the project are A/Prof. Ben Cazzolato, Stephen Bourn and Dr Carl Howard.

After proving the concept, the intention is to attempt to break the world sailing speed record and ultimately achieve the goal of 54 knots (100 km/h). Thereafter, commercial production may be undertaken to satisfy demand for such high performance sail craft for either the sailing equivalent of Formula 1 racing or as a form of recreational 'extreme sport'.

DESIGN

The design was inspired after a fresh look at the basic principles of sailing and examination of the absolute limits to high performance sailing.

This craft is intended to fly more like a plane than sail like a boat. The hull is supported and propelled by a wing sail inclined and offset to one side as shown in Figure 1 & 2. The wing pulls the hull up to fly smoothly just above the waves while a hydrofoil assembly provides lateral resistance to counteract the sail force as well as generating additional lift. The craft has been designed to sail at more than twice the wind speed. It is expected that in light to moderate winds, with the hull still in the water, the WBHF will be just as fast but easier and safer to sail than the quickest existing boats, because of its inherent stability and self-righting properties.

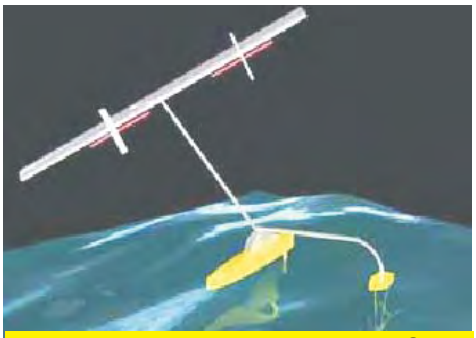

Figure 1: Rendered images of the WBHF illustrating its configuration when sailing. Image courtesy of Stephen Bourn.

Unlike many dedicated speed sailing craft, the WBHF has the ability to tack and sail in all directions, in a range of wind conditions and in exposed waters. The wing is able to adjust to the optimal angle relative to the wind via servo tabs. Although the craft incorporates design features to self-correct and stabilise should it be disturbed, there will be provision for the quick release of the wing in case of an emergency situation.

Figure 2: Rendering of WBHF showing the components of the craft. Image courtesy University of Adelaide.

The hull, designed to support either one or two people, is lifted out of the water when the craft achieves sufficient speed in 10-15 knots of wind, thus eliminating a significant source of drag, and accelerating the craft to considerably high speeds.

The craft is intended to employ several control systems to ensure stability once flight is achieved and also provide pilot control. Given these unique characteristics, it is believed the WBHF has the potential to challenge several sailing records including the bi-directional nautical mile sailing speed record and ultimately the world sailing speed record.

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THE ULTIMATE SAILING CRAFT - A WING BORNE HYDROFOIL (WBHF) (Continued From Previous Page)

The craft can be carried on a trailer, and should be able to be rigged quickly and be launched from a beach. The wing will be collapsible.

Main dimensions and weight for the craft are:

Hull length	3.6 m
Wing span	8.0 m
Wing area	16 m^2
Hydrofoil span	0.9 m
Width	5.5 m
Weight	75 kg
Ballast	30 kg

CONSTRUCTION

The craft is being constructed with extensive use of carbon fibre composite sandwich materials using vacuum resin infusion techniques to ensure high strength and minimum weight.

Over the 2007-2008 summer, work was underway on various components of the craft. After initial difficulties achieving satisfactory resin infusion of the curved tubes for the cage connecting the hull to the main beam, a good technique was developed and all four cage tubes are now ready for fitting to the hull. One hydro stabiliser foil has been successfully moulded, with the second one currently in progress. The remaining work on the hull, main beam, bearings and outrigger float is yet to be undertaken. The hull and foil assembly are seen in Figure 3 and 4.

The goals of the 2008 student project will be to complete the design and construction, launch the craft and test and tune the control systems. Specific tasks in 2008 will include:

- design and construction of the twin joystick control inputs and power supply,

- program, test and tune the hydrofoil control (including towing trials),

Figure 4: The students display the progress made on the hydrofoil assembly for the craft. Photo courtesy University of Adelaide

Figure 3: Adelaide University mechanical engineering students display the composite hull behind a scale model of the craft. Photo courtesy University of Adelaide.

- review and complete the aerofoil design and construction,

- program, test and tune the aerofoil control (including captive carriage trials),

- test and tune the complete craft (starting with towed trials and finally independent operation),

- design and build a canopy for the cockpit and fairings for the main beam interconnecting the float, hull and wing assembly,

- design and build hydrofoils capable of operating at 50 knots free of cavitation, and

- review the aerofoil design and if necessary develop design modifications for operation at 50 knots.

Further details of this interesting project including a detailed report are available at the University of Adelaide School of Mechanical Engineering's WBHF website: http//www.mecheng.adelaide.edu.au/robotics/robotics_projects.php?wpage_id=44&title=43&browsebytitle=1 with further details at the wing-borne hydrofoil website: www.wingbornehydrofoil.com which contains a technical paper containing the sailing performance analysis for the craft. The designer, Stephen Bourn, can be contacted via e-mail: sbourn@ wingbornehydrofoil.com

WELCOME NEW MEMBERS
(Continued From Page 2)

Aaron Eckert - Aaron has a B.S. Degree in Aerospace Engineering from the University of Maryland, 2006. He is employed by Maritime Applied Physics Corp. (MAPC) as an Aerospace Engineer with a variety of experience in the design and operation of Ground, Air, and Sea vehicles. His background includes extensive testing of Unmanned Air Vehicle aerodynamics and propulsion. His design experience includes design of an unmanned semi-submersible that offers endurance on the order of weeks and is capable of being air dropped. In addition he worked on the design of an Unmanned Ground Vehicle featuring low weight, moderate payload capacity, and high maximum speeds. He has performed extensive work in the automotive and heavy equipment fields with a focus on engines and transmissions.

Andrew Hall – Andrew graduated with a Bachelor's degree in Naval Architecture/Marine Engineering from the University of New Orleans (UNO) in the Spring of 2003. Since then, he has worked at Keel Design, Inc. in New Orleans and, post-Katrina, at MAPC in Baltimore, MD. He has been involved in small vessel and model testing design work in addition to larger vessel work that has ranged from day to day operations to significant structural modifications.

IHS OFFICERS 2007 - 2008

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

DO YOU REMEMBER SEA LEGS?
(Continued From Page 7)

sensor. This device provided a continuous measurement of the distance between the bow and the water surface. The original design of SEA LEGS called for about an 8,000 pound displacement, but the weight grew to 10,550 lbs.

SEA LEGS Underway

The foils were made of aluminum and arranged in a canard configuration with about 30 % of the lift on the forward foil and the remainder on the larger aft foil. Each foil had a trailing edge flap that was hydraulically actuated.

SEA LEGS made its first flight in 1957 and demonstrated its excellent seakeeping performance in rough water up to speeds of 27 knots.

During the latter part of 1957 and early 1958 the craft continued its demonstration flights for Navy and civilian visitors in the New York area.

It was in June of 1958 that the Chief of Naval Operations, Admiral Arleigh Burke approved a demonstration trip to the Washington, DC area. Arrange- ments were made to have SEA LEGS escorted by a Navy torpedo boat, the PT-812. The craft got underway for Cape May, New Jersey on 15 July 1958. After stopping over night and refueling, SEA LEGS proceeded through the Delaware Canal to the Navy's small boat facility on the Severn River in Annapolis, Maryland where it and the PT boat arrived on the afternoon of 16 July, 1958.

To be Continued in the Next Issue

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

2005-2008	2006-2009	2007-2010
Joel Billingsley	Mark R. Bebar	Sumi Arima
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The NEWSLETTER

International Hydrofoil Society

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

Editor: John R. Meyer | Third Quarter 2008 | Sailing Editor: Martin Grimm

ARIES Hydrofoil Museum Update

By Eliot James, IHS Member

While The USS Aries Hydrofoil Memorial Inc. organization has had its 501c3 tax exempt status for several years, we were in a probationary period for the first 5 years of organizations status. We have past the probationary period and review by the IRS and can breath easier about our status.

We have always known that the ARIES (previously USS ARIES) needs a proper home, somewhere that appreciates naval museums and has traffic that would make the museum financially feasible. Over the past several years, we have been working on getting ARIES back into sailing shape, albeit slowly. We are close at this point, and have since been working on putting together more exhibits that complement the ARIES. It is our intention to put together a proposal and start circulating it to cities that may be interested in such a museum.

ARIES Parked in St. Louis on Way to its New Home in Brunswick

See ARIES Memorial, Page 3

SUSTAINING MEMBERS

YOUR 2008 IHS DUES ARE DUE

See Full Announcement on Page 2

INSIDE THIS ISSUE

PRESIDENT'S COLUMN

To All IHS Members

Terence Orme, owner of High Point, has informed us that the High Point Website is Up and Running. Log onto (www.usshighpoint.com). Terry feels that it's a little bare bones right now but hopefully it will give us a greater chance to reach out to more Veterans in the original Hydrofoil Program. He has plans now to move the ship to Cathlamet. He had the first High Point reunion on July 18 attended by Sumi Arima, his wife and several Hydrofoil Volunteers.

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.

IHS Members in the Washington, DC area were fortunate to be able to attend a Joint Meeting of the IHS and the SNAME SD-5 Panel on 18 June. The presentation was about *Destriero* by Don Blount, President, Donald L. Blount and Associates, Inc., Chesapeake, VA. Don reminded us that in 1992 *Destriero*, a 68-meter 1100 metric ton gas turbine powered motor yacht, set a trans-Atlantic speed record (53 knots average) that no other ship has come close to breaking. See more details of the presentation and how to obtain copies of articles about *Destriero* on page 8 of this NL.

Since the close of 2007, we have had only 12 new members added to the Society's roles. We started off the year pretty well, but the numbers have dropped off quite a bit. So …. All members are asked to encourage your colleagues to join. Please make them aware of the IHS website and the features regarding membership.

I want to remind you that you can view the Membership List (a new one was just generated) 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

During this past Quarter, High Caliber Solutions (HCS) has re- started work on putting together the **Newsite**, mentioned in previous Newsletters. In the meantime several of the Committee members have prepared material for HCS to use as a basis for the site development. The latest version of the draft material from HCS included the Opening, "What is a Hydrofoil", "Why Hydrofoils", Why and How Do Hydrofoils Fly". This will be followed by Hydrofoil History - A Century of Hydrofoil Development (including several videos), Sailing and Recreational Hydrofoils. I will keep you informed.

John Meyer, President

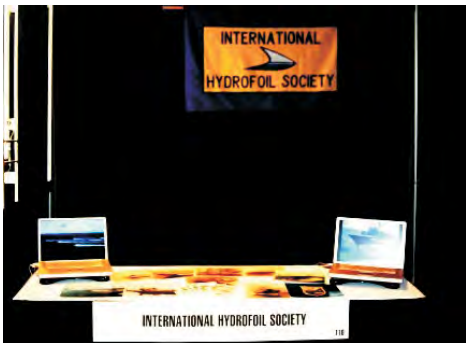
IHS PARTICIPATES IN ASNE DAY 2008

Public Relations Chairman, Joel Billingsley (IHS and Board of Directors Member), had made arrangements for the IHS to participate at no cost in ASNE Day on 23-24 June at the Hyatt in Crystal City, Arlington, VA.

The exhibit area opened on Sunday, 22 June, to set up booths. Dennis Clark and Frank Horn had volunteered to staff the booth.

Shown here is IHS Vice President, Mark Bebar, who stopped by the booth and Dennis Clark who manned the booth on Monday.

Frank Horn greeted visitors on Tuesday and was pleased with the interest shown by many of the visitors; one of which was a former PHM CO.



Shown above is the table containing pictures, IHS Flyers and two Laptops used to show videos and a Hydrofoil slide show.

ARIES MUSEUM
(Continued From Page 1)

Our hydrofoil fleet has been growing, and now includes ARIES, 3 Dynafoils, a Waterspyder, and President Nixon's Volga (see article on page 9). We are hoping to add FRESH-1 to our fleet and could use any help anyone can give in that endeavor. We are not focused on static displays, but hydrofoils that fly, while we lack an ACS and LM2500 for ARIES, we have our other hydrofoils flying.

ARIES on the Missouri River in Brunswick

FRESH-1 was at the time of the sale to her current owner, in flying condition. The years have been hard on her, but the damage is not irreversible, or out of our technical capability. Like ARIES, FRESH-1 has all the custom parts that made her unique, but unlike ARIES, FRESH-1 has her engine. An ACS would still have to be fabricated, but given today's technology, a new digital control would be easier and cheaper than restoring the old one. One nice thing about FRESH-1 is the use of jet propulsion. There are no additional drives, transmissions, or water propulsors. This will significantly reduce the amount of work in restoring drive components. As for hullborne propulsion, we only need a pair of outboards with an economical fuel usage rate.

We believe that by bringing our hydrofoils to flying status, we will not only make a more interesting museum, but could generate significantly more interest by flying our displays to different locations, waterfront festivities, boat shows, other marine museums where we would be visiting exhibits. We could work with companies and universities as test beds for experiments in advanced marine vehicles.

Our goal is not to just preserve history, but to foster new ideals and concepts and offer a working representation of what has been up to now, the state of the art in marine transportation.

What we need is a place where this project can grow. We are looking for dockage of at least 200 feet of dock space accompanied by shore side areas large enough for storage, maintenance, and ongoing restoration of the exhibits. The shore side building area would also provide space for interaction with the public.

We are open to examining any location. We want what would make the most sense for the museum. Any help anyone in the IHS or Historical Naval Ship Association (HNSA) or any other organization or individual can give would be greatly appreciated.

NEW FOIL ASSISTED DESIGN FOLLOWS TRICAT TRIALS IN HONG KONG

(From Fast Ferry International, March 2008)

The two principals of Ad Hoc Marine Designs, Nigel Warren and John Kecsmar, have joined forces with Dr Gunther Migeotte (IHS Member) of Icarus Designs to produce a fast ferry design that offers the same performance as existing vessels but significantly reduced fuel consumption by using foils.

Nigel Warren and John Kecsmar were previously part of the design team at FBM Marine in the United Kingdom. Dr Migeotte was previously technical manager of Unistel, a South African company owned by Stellenbosch University.

In the summer of 2006, Unistel conducted a series of sea trials in Hong Kong on one of TurboJet's FBM Marine TriCat 45m catamarans, *Universal MK 2005,* that had been fitted with foils.

The aim was to increase service speed without increasing power. The concept uses foils that lift the hulls sufficiently far enough out of the water to significantly reduce overall resistance.

Unistel has installed similar foil systems on smaller vessel all over the world with amazing success. However, the challenge for the larger TriCat pushed the envelope of the known technical knowledge further.

The foils were designed and built to Det Norske Veritas Class, including 100 tonne impact with baulks of timber.

Continued on Next Page

TRICAT
(Continued From Previous Page

FBM Marine TriCat 45m Catamaran Universal MK 2005 During Trials of the Foil System in 2007.

Trial Results

An increase in speed of 5 knots at less power was achieved on *Universal MK 2005* before ventilation of the waterjets prevented trials at the normal service rating of the gas turbine engines. Conversely, fuel consumption at 40 knots was reduced by 20%.

The Aft Foil Installation on Universal MK 2005. The Hulls are not an Ideal Match to Utilise the Full Benefits of the Foil

All the predictions from model tests were met up until the ventilation of the waterjets occurred at 45 knots, which could not be adequately predicted from the model tests. However, the trials provided Dr Migeotte with enough data to collaborate with Ad Hoc Marine Designs to refine the concept.

New Design

The resulting new hull design eliminates the possibility of ventilation of the waterjets. Whereas the original TriCat hull form was optimised for a waterline length of 40m and a displacement of 200 tonnes, foil assistance allows the hull form to be optimised for around half this displacement and is, consequently, very narrow whilst keeping the immersion of the waterjets the same as on the original TriCat design.

The design of the hull and the foils is integrated whereas of course adding foils to an existing design can only be a compromise. The new design, based upon the original TriCat, has an expected maximum speed of 46 knots, using diesel power, and a service speed of 42-43 knots.

The fuel consumption saving is 30% compared to a similar 300 passenger fast ferry operating at the same speed. All data is correlated to the original TriCat and its performance. Other benefits of the foil system are a reduction in vertical accelerations (ride control is integrated into the fore and aft foils) and lower wash characteristics.

AAM BUILDING CATAMARAN FOR TENNESSEE AQUARIUM

(From Fast Ferry International, Jan-Feb 2008)

All American Marine is building a Teknicraft Design 20m foil assisted catamaran at its Bellingham, Washington, yard for the Tennessee Aquarium in Chattanooga.

The builder reports, "The Aquarium is located along the banks of the Tennessee River and is a major attraction, featuring an IMAX theatre, fresh and saltwater aquarium exhibits, and river tours.

Rendering of Tennessee Aquarium Foil Assisted Catamaran

"The catamaran is designed and being constructed according to US Coast Guard subchapter T requirements. The lifting effect produced by the Teknicraft hydrofoil and signature hull shape will cause the vessel to draft less than a foot of water [0.3m] as the vessel cruises its 24 mile route up and down the river.

Continued on Next Page

FOIL ASSISTED CATAMARAN
(Continued From Previous Page)

Tennessee Aquarium has ordered a Teknicraft Design 20m foil assisted catamaran

Foil Assisted Catamaran Particulars:
Length 19.8m
Beam 7.2m
Speed 43 knots
Passengers: 70
Main engines 4 x Caterpillar; C18ACERT; 650 kW at 2,200 rpm
Waterjets: 4 x Hamilton HJ 403

"The catamaran will comfortably seat 70 passengers and will whisk them through the Tennessee Gorge. The vessel features angled seating so each passenger can easily see out the windows or through overhead sky panes. Views of the gorge can also be enjoyed from the upper observation deck with 360 degree unobstructed viewing potential. An onboard kiosk is being crafted to offer guests refreshments."

HYDROFOIL YOUTUBE UPDATE

By Ray Vallinga, IHS Member

Because of contributions of many people, the hydrofoil videos posted on Youtube are enjoying success. In the beginning of May the total number of viewings for all 6 videos reached 50,000. My goals continue to be:

To promote hydrofoils, and to develop some "buzz" with the general public. To measure the public's interest in watercraft that fly. To judge the potential market for my book, "Hydrofoils, design, build and fly".

To establish some credibility for the book and its author, and eventually sell some books. Possibly inspire some others to design, build and fly a hydrofoil boat. To document the accomplishments of you and the other video contributors, and my goal remains to be in print by the end of the year.

The hydrofoil videos now on Youtube are:

1. OU-32, Yamaha's experimental jet powered boat designed by Kotaro Horiuchi.
2. Talaria IV, the 32' flying Bayliner by Harry Larsen.
3. Hifybe, motorized hydrofoil wind-surfer board, by Ray Vellinga. Two videos.
4. HYSWAS, Quest created by Maritime Applied Physics Corp and the Naval Surface Warfare Center. Two videos.
5. The Human powered hydrofoils of Dwight Filley and friends.
6. Dyna-foil and the Grumman hydrofoil runabout owned and photographed by Scott Smith.
7. Foilborne, the story of US Navy hydrofoil Development provided by John Meyer.

I plan to do another short video in response to inquiries received. It will be an explanation of what a hydrofoil is and what makes it fly.

DIVE BOAT OPERATOR ORDERS FOIL ASSISTED CATAMARAN

From Fast Ferry International April 2008

Calypso Charters has ordered a CMCS Sea Speed Design 15m foil assisted catamaran from New Wave Catamarans in Brisbane.

The diveboat will be the smallest of four delivered by New Wave Catamarans to Calypso Charters in Port Douglas, Queensland, since 2004.

CMCS managing director Paul Birgan reports, "The vessel will use the latest foil technology from Murray Burns & Dovell coupled with Seafury surface drives to give a substantial increase in speed and fuel economy over conventional propulsion systems."

New Wave Catamarans is Building a CMCS Foilcat 15 Foil Assisted Catamaran

FOIL ASSISTED CATAMARAN RETURNS TO SERVICE IN CARIBBEAN

From Fast Ferry International April 2008

A new company has been established in the Netherlands Antilles to operate 22.5m foil assisted catamaran *Sea Shuttle* I. The vessel returned to service in February between St Maarten and St Barths in the French West Indies.

As before, *Sea Shuttle I* is being marketed under the Rapid Explorer brand. The new operating company, Om Express, has been set up by Raymond Kalley, the London based businessman who owns the vessel.

Since last September, *Sea Shuttle I* and its main engines have been overhauled and a generator and key waterjet components have been replaced.

Continued on Next Page

FOIL ASSISTED CAT

(Continued From Previous Page)

Rapid Explorer Services are Again Operating in the West Indies

The Rapid Explorer operating base on St Maarten has been transferred from Philipsburg to Oyster Pond. Raymond Kalley explains that although this is further from the airport, the road journey is faster, 25 minutes compared with up to 2 hours. In addition, the ferry route is shorter and *Sea Shuttle I* can comfortably complete the crossing in 40 minutes.

Two return journeys a day have initially been scheduled. These leave St Maarten at 0830 and 1700 and St Barths at 0930 and 1800, except on Sunday when the first departures are retimed to 0930 and 1030.

ANOTHER RECORD YEAR FOR HONG KONG-MACAU TRAFFIC

From Fast Ferry International April 2008

The latest annual figures released by the Hong Kong Marine Department reveal that, as expected, 2007 was another record year for ferry traffic between Hong Kong and Macau. The total of 16,861,000 passengers that traveled last year was 17.5 % higher than in 2006.

When passengers traveling between Hong Kong Airport and Macau are included, the total for 2007 increases to 17,302,000, 17.9% higher than in 2006. Traffic on the Airport route increased by 34.9% but the number of passengers carried, 441,000, was still relatively small.

The total number of services operated on the Hong Kong-Central-Macau, Hong Kong Tsim Sha Tsui-Macau and Hong Kong-Airport-Macau routes increased by 9.8% in 2007 to 89,040 crossings. Although the Marine Department issues separate figures for Hong Kong and Airport passengers and for the number of catamaran and hydrofoil services, it publishes a single figure for all Macau ferry services at the Hong Kong Macau terminal in Central, the Hong Kong China terminal in Tsim Sha Tsui and the Hong Kong Airport terminal.

Hong Kong-Macau passenger traffic 2007

	Passengers	Change	Services	Change	Average load factor To HK	From HK
Hong Kong Macau & Hong Kong China terminals						
Catamarans	9,920,000	+24.8%	50,980*	+15.1%	49.6%	62.7%
Jetfoils	6,941,000	+8.5%	38,060*	+3.5%	74.9%	76.4%
Totals	16,861,000	+17.5%	89,040*	+9.8%		
Hong Kong Airport terminal						
Catamarans	441,000	+34.9%	-	-	47.0%	15.2%
Totals	17,302,000	17.9%	89,040*	+9.8%		

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

TurboJet operates from the Hong Kong-Macau and Airport terminals and New World First Ferry from the Hong Kong China terminal. For ten days at the end of 2007, CKS Passenger Shipping was also operating between the Hong Kong-Macau terminal and Macau on behalf of Venetian Marketing Services/Cotal Jet.

The Marine Department does not issue traffic figures for the individual operators either. However, Shun Tak Holdings' latest interim report reveals that its TurboJet division carried over 6 million passengers in the first six months of 2007 and in a presentation last September to the 3rd Fast Ferry Information Conference, New World First Ferry general manager John Hui said that his company was now carrying more than 3.72 million passengers each year.

Another record year for Hong Kong-Macau traffic is anticipated in 2008. It should certainly be a record year for the number of services operated - Venetian Marketing Services has taken delivery of five Austal 48m catamarans and another five are due to arrive in Hong Kong by August; New World First Ferry will be introducing another two Austal 47.5m catamarans this summer, and a fourth operator on the route, Giant Dragon Sea Transport, is scheduled to take delivery of four Marinteknik 65m catamarans between May and September. How long will it be before Shun Tak orders new catamarans?

Venetian Marketing Services will be taking delivery of another four Austal 48m catamarans in 2009 and is likely to place orders for more ferries in the near future. The company says that a Hong Kong Airport-Macau route is "coming soon".

Mainland Routes

During 2007, ferry services were operated between Hong Kong and 12 locations in Mainland China. Six routes have been discontinued in recent years but the situation now appears to have stabilized. A total of 6,739,000

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HONG KONG-MACAU TRAFFIC
(Continued From Previous Page)

passengers were carried, an increase of 4.0% compared with 2006. Five routes suffered falls in traffic.

The most popular route, by far, continued to be Jiuzhou (Zhuhai)-Hong Kong, which carried 2,061,000 passengers in 2007, an increase of 13.1 %. Zhuhai is just over the border from Macau.

Five routes were operated between Hong Kong Airport and Mainland China, one more than in 2006. The new route, between Jiuzhou (Zhuhai) and the Airport, was operated for just under six months but had an insignificant impact on total ferry traffic passing through the Airport.

LINK AQUA TRAINER

In April this year, IHS received an intriguing email message from Emmett Smith which commenced: "I am writing from the Antique Boat Museum (ABM) in Clayton, NY, a non-profit museum for the preservation of North American pleasure craft. We have a very unusual artifact in our collection which I have realized uses hydrofoil technology."

Emmett, the Collections Assistant at the museum, was keen to gain feedback from IHS about this item and its place in the history of hydrofoil technology. In a series of messages thereafter, he provided us with further details of the craft, known as the "Aqua Trainer" as well as a number of photographs of it in operation and in its present state.

In 1929 Edwin Albert Link designed a prototype flight simulator which was subsequently further developed and produced in large numbers, known as the "Blue Box" and also as the "Link Trainer". These were used extensively during and beyond WWII as pilot training aids.. Link Trainers were mounted on a stationary base however could roll, pitch and yaw.

The Aqua Trainer was a variant of the flight simulator that Ed Link designed specifically for training pilots to land seaplanes on water. While the prototype was built in 1941 and thereafter successfully demonstrated, it was never put into production.

Overall View of the Aqua Trainer

The prototype Aqua Trainer was donated to the Antique Boat Museum by Ed Link in 1972. While no longer on public display, the Aqua Trainer fortunately remains well preserved at the museum. The museum is located in Clayton, NY, in the Thousand Islands region of the St. Lawrence River on the northern border of NY State.

Edwin Albert Link was born in Huntington, Indiana in 1904. Link was a pioneer in aviation, underwater archaeology, and ocean engineering.

On occasion Link flew an amphibious plane, and this is apparently what started him thinking about the need for a simulator to simulate landing on water. The prototype Link Aqua Trainer was built in a Ganonoque plant and tested on the St. Lawrence River [see photo on p. 8].

Although the Aqua Trainer hadn't been accepted by the Navy, was never developed to a completely practical stage and remained tricky to operate, it was none the less a remarkable device. It was able to rise up out of the water, responding to the pilots control movements of its controls and incorporated several new concepts.

The Aqua Trainer is essentially a short airplane-like fuselage supported by two pontoons when stationary. The fuselage is perched on top of a single tall strut which extends down into the water. At the base of this strut is essentially an 'underwater airplane'. The engine, positioned low to provide sta-

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.

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

LINK AQUA TRAINER
(Continued From Previous Page)

bility, is encased in a streamlined steel pod. The engine drives a forward mounted marine propeller via what appears to be pulleys and multiple drive belts. The gasoline engine adopted for the trainer was an American Bantam four-cylinder flathead marine conversion.

A pair of hydrofoils project from either side of the top of the engine pod and are braced with struts. Attached to the rear of the engine housing are a pair of support struts for a rudder, horizontal stabilizer and elevator. Control surfaces include the rudder, elevator and a pair of ailerons forming the tips of the main supporting hydrofoil 'wings'. These appear to have been controlled manually by the 'pilot' in the cockpit using a joystick and rudder pedals.

Aqua Trainer Underway Foilborne.

The underwater controls would undoubtedly have been configured in an effort to simulate the feeling and controls of an airplane. The fluid dynamics of the water would make it possible to mimic airborne operation much more effectively than the land-based Link Trainers did as they sat on the floor. It therefore makes sense that Link would have configured the design in the same way as an airplane, simply scaled to operate in a denser fluid. The controls would have had essentially the same effect as the controls on an airplane except that the control surfaces and propulsor were completely submerged, hence control forces were hydrodynamic rather than aerodynamic.

When stationary or operating at low speed, the craft was supported by the combined buoyancy of the pair of pontoon floats, the centerline strut and engine housing. As speed was built up, lift generated by the hydrofoils supported a greater portion of the weight until the pontoons were completely free of the water.

Perhaps the fact that Link was an aviator, and not engaged in the field of Naval Architecture, account for why his ideas did not directly spread to the hydrofoil field, but were only independently adopted much later when the US Navy began to seriously investigate fully submerged hydrofoil concepts.

Further descriptions of Edwin Link and his Link Trainer developments can be found on the Wikipedia at http://en.wikipedia.org/wiki/Link_Trainer Even though the Aqua trainer is not on display on the Museum campus, it is in "viewable storage."

If any IHS members are aware of any further details of the history of this craft, or have further comments on the place of the Aqua Trainer in the history of hydrofoil technology, your newsletter editor and Emmett would be delighted to hear from you. Emmett can be contacted at: emmett@abm.org

DESTRIERO PRESENTATION

As mentioned in the Presidents Column, IHS Members in the Washington, DC area attended a Joint Meeting of the IHS and the SNAME SD-5 Panel on 18 June. The presentation was about *Destriero* by Don Blount, President, Donald L. Blount and Associates, Inc., Chesapeake, VA. Don reminded us that in 1992 *Destriero*, a 68-meter 1100 metric ton gas turbine powered motor yacht, set a trans- Atlantic speed record. She traveled the 3106 nautical miles at an average speed of 53.09 knots. In her final 24 hours she covered 1402 nautical miles (average speed 58.42 knots), another record that still stands. *Destriero* remains a very impressive ship today, irrespective of technology advances since she was built. In fact, the hullform of LCS 1 is derived from *Destriero's*.

The presentation covered the complete development of *Destriero* through construction, and on to the record Atlantic crossing. All releasable material was in the two issues of ProBoat about *Destriero* and the magazine publisher gave written permission for IHS to list their web site so that members could access archive issues.

Here is the information to their web site: www.proboat-digital.com Click on "archives" at the top of the home page. Go to issue October/November 2007 for Part One of the article. At the bottom of the page, click on "Developing *Destriero*". Go to issue December/January 2007 for Part Two of the article. Above the magazine cover, click on next page to Feature articles (contents) and click on page "50" Record Run.

HAYATE TO FLY AGAIN

HAYATE, a 17.1m, 1/6 scale demonstration test ship for the Japanese Ministry of Transport's *Techno Super Liner* development program, was built by Kawasaki Heavy Industries Ltd and tested on Osaka Bay in 1994 to evaluate the viability of HYSWAS (Hydrofoil Small- Waterplane-Area Ship) as a candidate for the TSL hull design. HYSWAS is a hybrid hull design that combines foil lift with partial buoyant support, and was extensively explored by the USN.

Today, *HAYATE* is on static display at Kobe Maritime Museum, having served her intended purpose. But this innovative craft's story does not end there. *HAYATE* will soon fly again in the form of a Radio Controlled R/C) model now under construction by expert craftsman Yoichi Takahashi. The construction in progress is illustrated here with sample photos from Mr. Takahashi's progress reports posted on the IHS BBS bulletin board (from the main IHS webpage).

Yoichi Takahashi's HAYATE Model

None of *HAYATE*'s drawings or design details are available to the public, so Mr. Takahashi took photographs at the Kobe Maritime Museum, then used them to create and tweak a CAD drawing until the details for his model were perfect for his R© model. Construction is well underway at time of publication. According to Mr. Takahashi, "The submerged body is complete and united with the lower hull section by the port and starboard struts at the main wing aft and the V-strut forward. The complex mechanical controls are built into the submerged body. Underneath the submerged body is the intake for the water jet propulsion system. A duct conducts the water from the intake, through the submerged body and up into the lower hull. It took a lot of time to build in this penetration type duct."

Visit the IHS BBS to see Mr. Takahashi's on-going progress reports. Also, visit and search for "gasturvin" to see impressive videos of Mr. Takahashi's Jetfoil model in action. The 1:40 scale model represents *CACILHAS,* a Jetfoil 929-115-018 built by Boeing in 1981 and operated by Hong Kong's TurboJET, the world's largest Jetfoil service company.

HISTORY OF THE HYDROFOIL GIVEN TO PRESIDENT NIXON

From history as received from NARA, National Archives and Records Administration

Provided by Eliot James, IHS Member

In May 1972, President Richard Nixon paid a head of state visit to the Soviet Union, during which he presented a modified Cadillac sedan to General Secretary Leonid I. Brezhnev, on behalf of the United States. Some three months later, in August, a reciprocal gift from General Secretary Brezhnev arrived on board a Russian merchant vessel at the port of Baltimore. The gift was a high-speed hydrofoil boat, Soviet Model 70.

In November 1972, the White House staff decided that this boat could best be used in the general service of the federal government at the Coast Guard Station in Miami, Florida, which then provided water security and water transportation for the presidential retreat at Key Biscayne. It remained in the Miami area until February 1977, when the Coast Guard reported it to the General Services Administration (GSA) as being excess to their needs.

The Volga Being Accepted in the U.S.

GSA's Property Utilization and Donation Branch then authorized the transfer of the boat to the Fish and Wildlife Service, with initial utilization in Louisiana, but the service location was changed in June 1977 and the boat was brought to the Washington, D.C. area for use in security and surveillance work by an unspecified federal security agency. The hydrofoil remained in the Washington area until February 3, 1982, when GSA authorized the Fish and Wildlife Service to dispose of it by donation to the Nebraska Agency for Surplus Property.

In 2005, the USS Aries Hydrofoil museum acquired President Nixon's Volga and began restoring the craft. She has been returned to the original paint scheme and undergone engine work. Currently she is operational and flies very well.

SAILOR'S PAGE

FOILER MOTH UPDATE FROM FASTACRAFT

By John Ilett

[The editor recently contacted John for an update of activities at Fastacraft. Here is his reply.]

"We are still making as many [foiler] moths as possible, five at time now but still have lead times of over six months".

Prowler Zero Foiler Moth Being Prepared for Sailing on the Swan River, Perth

The "Prowler" moth design has undergone a makeover since the last world championships in Italy with the introduction of number of design changes. In the process it also has been give a new name and is now call the "Prowler Zero".

The hull for the "Prowler Zero" is much the same design as the "Prowler" except that it has 75mm less freeboard at the bow. This saves on weight where every gram makes a difference to race performance. The stern height remains the same.

The centre case has been repositioned and the design now also incorporates a fully adjustable centreboard allowing the angle of incidence of the main foil to be changed from race to race using a pin stop arrangement. Setting

Looking Down on Prowler Zero. The position of Centre Case and New Centerboard Adjustment "F box" Mechanism are Apparent in this Photo.

options are either +1, 0, -1 or -2 degrees where zero is the standard position. John calls the adjustment mechanism the "F box".

New vertical strut sections have been adopted to reduced drag and increase flying height.

A new flapless rudder design and tiller adjusting mechanisms have also been adopted to further reduce drag and improve flying height control.

Fastacraft can now also supply their own new sails which are intended to be more suited for medium weight sailors.

John concludes: "The development game goes on, still lots more to come".

Close Up of New Centerboard Adjustment "F box" Mechanism Allowing Adjustment of Main Foil Angle of Attack Over a Range of 3 Degrees Using Securing Pins.

Further information regarding the foiler moths produced by Fastacraft can be found on their website (www.fastacraft.com) though, with the pace of production, the website does not yet report on these latest design developments..

WOT ROCKET SPEED SAILING CHALLENGER

In the previous Newsletter, we reported on the Wing Borne Hydrofoil (WBHF) speed sailing project. Another project aiming to break the outright sailing speed record which is currently underway in Australia is the Wot Rocket. An official website for this team, www.wotrocket.com, has since been established. A brief report on this project is provided here based on information from the website. For more details and latest progress with the project, visit the website.

The Idea

Four years ago, Sydney based skiff and keel boat sailor Sean Langman conceived an idea that could finally

Continued on Next Page

break the windsurfing fraternity's stronghold on the world speed sailing record. Langman joined forces with leading Australia based yacht designer Andy Dovell and had the craft built using the staff and facilities at his various Noakes Boat & Shipyards and finally teamed up with Wotif.com founder Graeme Wood

Overall View with Canoe Hull and Solid Sail Visible Behind Crew Pod.

who invested in the project because he "likes left of field ideas".

Built to break through the 50 knot barrier, the purpose built Wot Rocket is a cross between previous world sailing speed record holder, 'Yellow Pages Endevour', a foiling International Moth and a sailplane.

New with the Wot Rocket design is the introduction of supercavitation at lower speeds where control can still be maintained and from there to push through to top speeds.

The Design

Wot Rocket consists of a nine metre long canoe style hull with two tiny foils, each about a sixth of the size of a Moth foil and a nine metre rigid sail. A transverse beam connects an aerodynamic twin crew compartment to the hull. The craft is built entirely from carbon fibre and weighs approximately 400 kg.

View Showing Single Crossbeam Connecting Crew Pod to Hull

The foils have 15 degrees of movement each but only a few degrees will be used at speed. The front foil will provide lift, just enough to keep the foil in the water by around half a metre, while the aft foil will provide pitch and steering control. One of the foils is shown in the video on the official website.

In a task split, co-pilot Martin Thompson will be in the back seat controlling the foil pitch, while pilot Sean Langman will be up front steering and controlling the mainsheet and trimming the sail.

Crew have air canisters to allow 10 minutes to get out in case of emergency. The crew will wear full body harnesses, similar to those in F1 offshore powerboats.

The Current Record

The current World Sailing Speed Record of 49.09 knots was set by French sail boarder Antoine Albeau in March 2008.

Earlier, in 1993 Simon McKeon and his team with their boat 'Yellow Pages Endeavour' set the outright record of 46.52 knots in only around 20 knots of wind. This record stood until 2004 since when sailboards have held the record. The Yellow Pages team have continued to push to reclaim the record aiming for 50 knots. Their new craft, 'Macquarie Innovation' has reached 47 knots, but it requires the winds to be from a particular direction when sailing at a dedicated location in Australia to ensure smooth water. The Wot Rocket team believes their foils will deliver them the freedom to make their record attempts on water that is not at all smooth. Furthermore, the efficient wing sail and hydrofoils means Wot Rocket should only require 18-20 knots of wind, a fraction of the 45-50

Crew Pod.

knot winds that sail boarders have required, to achieve their speed records.

Trials and Record Attempt

On-water trials commenced on Botany Bay in Sydney Australia during May 2008 followed by design refinement work including re-shaping and balancing of the rudder to improve steering control.

The first attempt to sail Wot Rocket up on its hydrofoils was abandoned earlier in July when the breeze reached the high twenties.

Wot Rocket's notice of intention to make an attempt on the 500m world speed sailing record has now been lodged with the World Sailing Speed Record Council in the UK. August has been nominated as the period for an official attempt to break the 500m world speed sailing record to coincide with the winter westerlies that traditionally prevail. A Trimble GPS receiver will be used to record their speed, and two WSSRC representatives will be on standby for 28 days, the window allocated for an official attempt, to ratify the attempts.

DO YOU REMEMBER SEA LEGS

(Continued From Second Quarter 2008 NL)

After stopping over night and refueling, SEA LEGS proceeded through the Delaware Canal to the Navy's small boat facility on the Severn River in Annapolis, Maryland where it and the PT boat arrived on the afternoon of 16 July. During the open-ocean portion of the trip the boats experienced waves up to 4 or 5 feet, but SEA LEGS was able to maintain an average of 23 knots. It clearly demonstrated to the participants the superior seakeeping capabilities of this hydrofoil. The dry and comfortable ride they experienced would be impossible to duplicate on a comparably sized conventional craft. The conditions during this part of the trip were quite different on the PT boat which had been outrun by SEA LEGS in the bargain. It might be asked: who was escorting whom? After a week of successful demonstrations in the Annapolis area, SEA LEGS undertook the 170-mile run to Washington on 26 July. A Navy representative and crew arrived at the Naval Gun Factory in the afternoon after an uneventful trip down the Chesapeake Bay and up the Potomac River. The Naval Operations, ADM Arleigh Burke, along with a host of other high-level Navy dignitaries. It was recalled that 15 or 20 minutes before the CNO party was due to arrive, the autopilot "blew a tube" on the warm-up run and SEA LEGS crash landed. One of the crew managed to fix the system in the nick of time just before the Admiral arrived!

This was undoubtedly one of SEA LEGS' most important demonstrations. It lasted about an hour and 15 minutes, during which time all of the VIPs took a turn at the helm, and had the satisfaction of flying a hydrofoil. The trip to Mount Vernon and back was completed without a hitch to everyone's satisfaction. During the days that followed, SEA LEGS continued to display her unique capabilities to a wide variety of visitors. These included many Navy officers of flag rank, congressional representatives including Senator Saltonstall of Massachusetts and numerous members of the press, radio, and television. The craft returned to New York, arriving there on 20 August after covering 1851 miles of which l75l were on foils. The visitor "box score" for this all-important demonstration included 3 Congressmen, 17 Admirals, 3 Marine Corps Generals, 3 Assistant Secretaries, and numerous other important civilian and military personnel for a total of 375. This was an impressive accomplishment and one that had a significant impact on the Navy's future course of action in the hydrofoil arena.

In 1962 and 1963 SEA LEGS underwent a more detailed evaluation by the David Taylor Model Basin, more recently known as the Naval Surface Warfare Center, Carderock Division. The craft was extensively instrumented to provide at-sea data for future hydrofoil designs. This marked the beginning of the change from when hydrofoils were carried out on a "cut-and-try" basis to a more scientific approach of collecting design data and establishing design criteria. This information was much needed for the hydrofoil ships that were to follow. After the trials, SEA LEGS was retired with honors and refurbished for the Smithsonian with the financial aid of Gibbs and Cox. SEA LEGS is currently on display at the Mariners Museum, Newport News, Virginia.

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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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EXTRA FOR THE ELECTRONIC EDITION

HAYATE TO FLY AGAIN

(Continued From Page 9)

In 1989, research and development for a new type of high-speed ship dubbed the Techno Super Liner (TSL) began in Japan with the intent to advance the state of marine transportation and realize the potential of creative technology in shipbuilding. The development goal was to achieve a speed greater than 50 knots (93 km/hr), a loading capacity of more than 1,000 tons, a cruising range of more than 500 nautical miles (about 930 km), and the capability to operate smoothly in rough seas.

None of HAYATE's drawings or design details are available to the public , so Mr. Takahashi took photographs at the Kobe Maritime Museum, then used them to create the detailed dimensions for his working, radio-controlled model.

***HAYATE* foilborne during test runs in 1994**

***HAYATE* today. On exhibit at Kobe Maritime Museum**

The TSL development effort created two pilot model ships: an air pressure combined type ship *HISHO* (about 70 meters length) and HAYATE. Trials were conducted under actual ocean conditions to verify and evaluate the design study results for technological elements, including ship type performance, structural strength, suitability of new materials, propulsion machinery, and attitude control systems.

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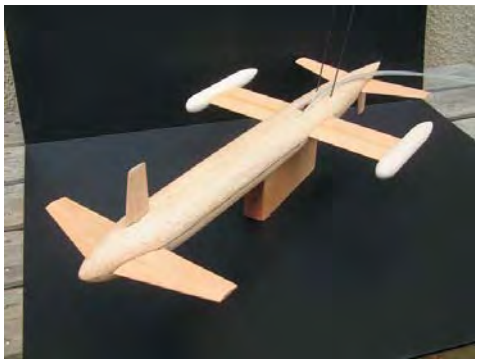
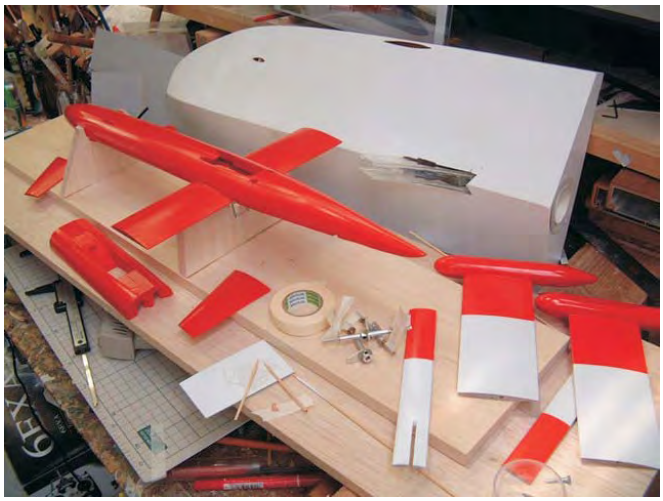
HAYATE TO FLY AGAIN
(Continued From Previous Page)



(Above) Yoichi Takahashi Began His Model of HAYATE in April 2008. The photo shows the submerged body, constructed of wood.

(Above) Temporary fit up of the hull, hydrofoil submerged body, and water duct. The long (45 cm) duct is mocked up in paper to verify fit and design. The submerged body is supported by a V-type strut forward and the main strut on the centerline.



(Left) The submerged body was completed in June 08. It contains a complex link mechanism that adjusts the foil system to control pitch, roll, and yaw while foilborne. Later in June, Yoichi Takahashi completed assembly of the submerged body to the hull as shown in the three views below. The water intake for the jet propulsor is in the bottom of the submerged body.

(Below) The custom-built waterjet pump is built into the transparent duct. A drive shaft connects to the motor via a penetration in the duct.

HAYATE TO FLY AGAIN
(Continued From Previous Page)

Will it Really Fly?!

IHS has received many notifications over the years from hobbyists and students of their intentions to build a working hydrofoil model. In each case we provide what information we can and encourage the person to send back fotos and story of the completed model for the Newsletter. We almost never hear back.

Yoishi Takahashi is a notable exception. His previous project to create a working 1:40 scale model of the Jetfoil *CACILHAS* was executed to perfection as the videos on YouTube.com attest.

The Boeing Jetfoil 929-115-018 *CACILHAS* is now plying the Hong Kong area waters in the service of Hong Kong TURBJET Co.

TurboJET is the brand name for the operations of the Hong Kong-based Shun Tak-China Travel Ship Management LTD, which was established from the joint venture between Shun Tak Holdings LTD and China Travel International Investment Hong Kong Limited in July 1999. It operates hydrofoil ferry services in southern China.

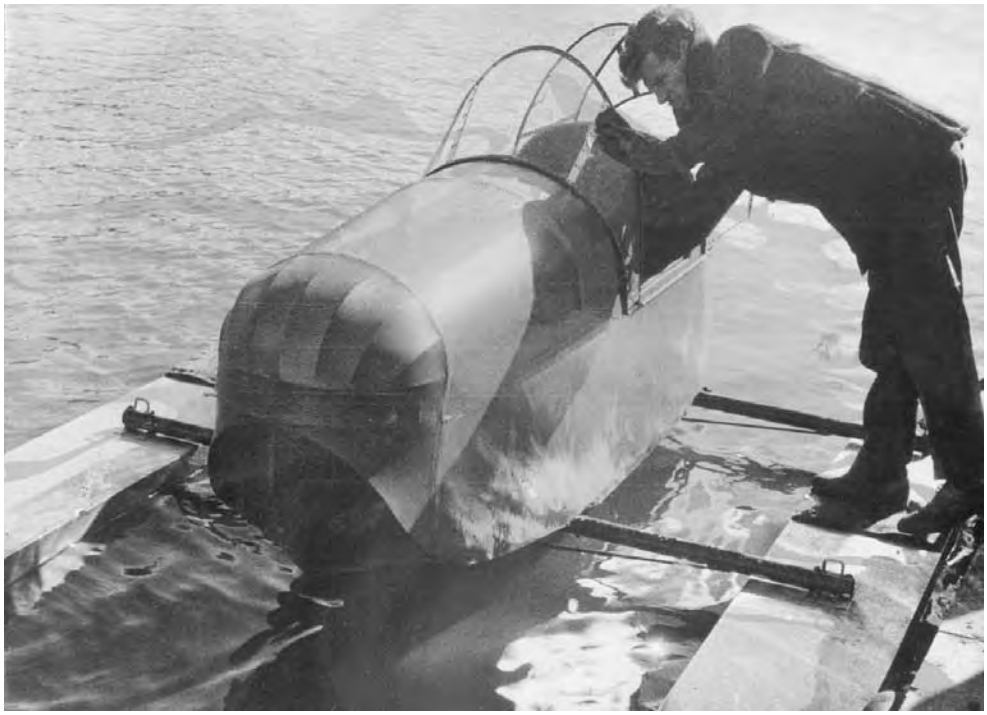
IHS Bulletin Board (BBS)

The Newsletter comes out four times a year, but the IHS BBS is always "up" for news reporting, technical discussions, requests for help and more. The BBS is open to all. Just go to the IHS main page at www.foils.org and click the link to the BBS.

Helpful hydrofoilers are encouraged visit the BBS regularly, review the latest postings, and share your news and knowledge. If you know the answer or can point to a person who does... please answer the posting accordingly. Thank you!

LINK AQUA TRAINER

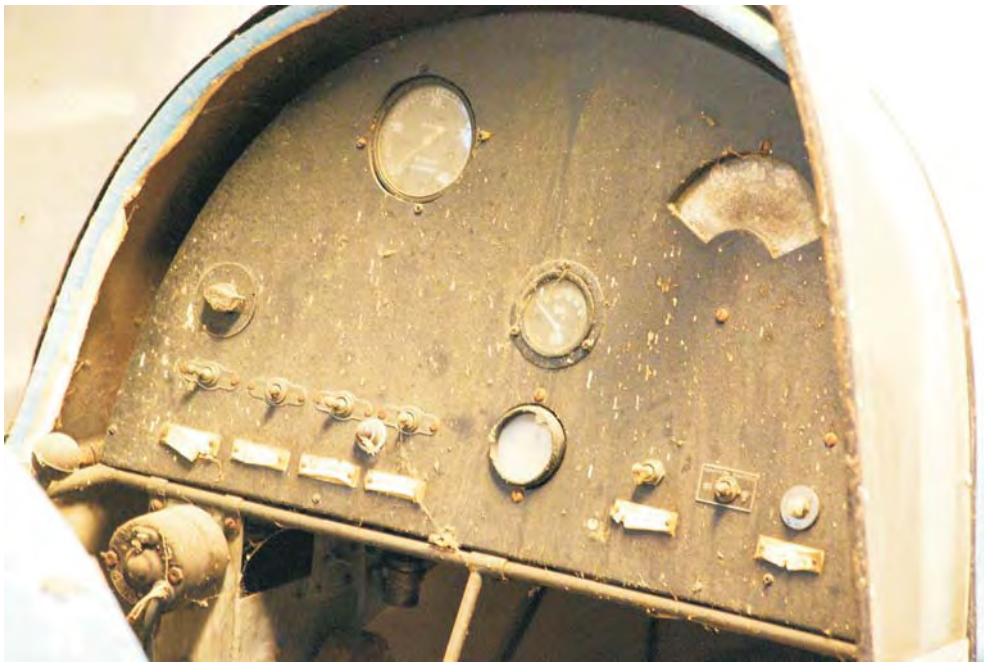
(Continued From Page 8)



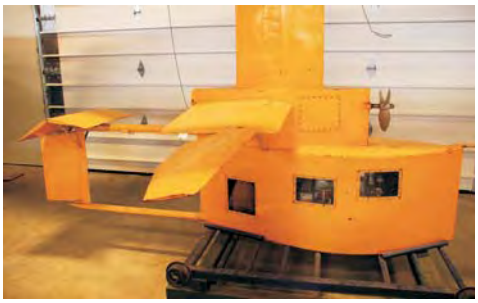
Link Aqua Training Floating Hullborne

Edwin Albert Link was a pioneer in aviation, underwater archaeology, and ocean engineering. However he is best known for inventing the flight simulator. He managed the very successful "Link Aviation, Inc" and the production facilities in Binghamton, New York, and Gananoque, Ontario, at one time employed thousands of workers.

(Below) Instrument Panel Inside the Cockpit



(Above) Aqua Trainer Cockpit
(Below) Submerged Section



Much of the original control mechanisms in the cockpit are now disconnected, and a few pieces may be missing, however the controls available to the 'pilot' included:

- Yaw control (or steering) with rudder using foot pedals
- Pitch control with elevator using forward and aft movement of joystick,
- Roll control with hydrofoil wingtip ailerons using lateral movement of joystick, and
- Speed control with throttle controlling engine and propeller RPM.

Continued on Next Page

LINK AQUA TRAINER
(Continued From Page 8)

A Groundbreaking Concept

When the Aqua Trainer was built, hydrofoil craft were still in their infancy with only few successful craft having been operated. The layout and control of the Aqua Trainer, while a logical extension of aircraft aerodynamic principles, appears to represent several firsts for hydrofoil applications. These include the layout of the hydrofoils (fully submerged and controlled), the use of control surfaces for 3-axis control, and possibly the use of a snorkel-mounted motor, particularly for an application other than a submersible.

Seaplanes were widely used by US forces during WWII. They would often have to land in fairly rough sea conditions. Training seaplane pilots for water take-offs and landings would therefore have been vital. Just as with its land based simulator counterpart, the Link Aqua trainer could have been built more quickly and with less raw materials than a complete aircraft. It would likely also have been a safer means to train large numbers of pilots quickly for water landings. It is therefore unclear why the Aqua Trainer was not further developed.

It is perhaps also unfortunate that the craft did not proceed into larger scale production as this meant that it has remained a relatively obscure innovation, essentially remaining unknown to the hydrofoil community until now. Perhaps Link's being an aviator, not a Naval Archit, accounts for why his ideas did not directly spread to the hydrofoil field, but were only independently adopted much later when the US Navy began to investigate fully submerged hydrofoil concepts seriously .

From the Foils.Org BBS

Large Scale Hydrofoil Vessels Planned?

Q - Is any hydrofoil design realistically planned for bigger ships? Say with 2000t deadweight? Are there plans on the table to introduce hydrofoils for big cargo transport at higher speeds? -malanbno@hotmail.com

A- Hydrofoils with displacements over 1000 tonnes have been proposed occasionally over the years, but no very large hydrofoils have ever been built, and I am not aware of any planned for construction.

Naval hydrofoil frigates of 1300 to 2400 tons displacement were developed to conceptual level for the USN in the 1970s.

Over the last decade, there have been concept studies of partially hydrofoil supported fast cargo vessels. One detailed at a maritime conference about two years ago was proposed to be fueled by LNG (Liquid Natural Gas).

Earlier, significant investments were made in Japan as part of the Techno-Superliner (TSL) project to develop high speed cargo vessels. The design target was for a speed of 50 knots, a range of >500 nautical miles, and a payload of approximately 1000 tonnes.

One proposal to meet this requirement was for a hybrid buoyancy and hydrofoil supported vessel (often referred to as HYSWAS). A 1/6th scale prototype of such a vessel was built (named *HAYATE*) but work never progressed on building the full scale design. HAYATE is now on static display at the Kobe Maritime Museum

I feel that large scale hydrofoil vessels may never be built unless there are fundamental breakthroughs in reducing resistance. It only becomes viable to use hydrofoil support for vessels requiring a high speed. At low speed, well designed displacement vessels are more efficient (ie have lower resistance). As the payload requirement increases and hence the vessel becomes larger, the required speed for a viable hydrofoil design (compared to a displacement hull) further increases. The required power to drive such a large and high speed vessel therefore becomes enormous. In these times of high fuel costs, I can't see any established operators taking the risk of experimenting with such high speed cargo ships even if they might be technically feasible. - Martin Grimm

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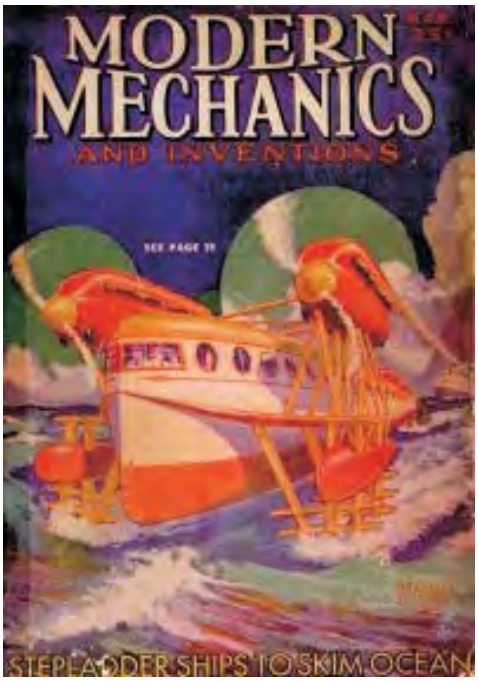


"Ocean Skimmer for Atlantic," *Modern Mechanics*, March 1930. p.79. "At last the 'stepladder boats,' as the hydrofoil speeders have been called, are to make a bid for laurels as the fastest method of crossing the Atlantic. They are to be placed in regular service soon, according to plans of the inventor, and already the preliminary engineering, based on many model and full sized tests, has been done."

LARGE SCALE HYDROFOILS PLANNED?
(Continued From Previous Page)

(Above) Fitz-Gerald, Wm. G., "To Cross Atlantic in Thirty Hours," *Technical World,* Oct 1907, pp 139-142.

"Peter Cooper Hewitt of New York is a scientist and inventor of high reputation and proved achievement. He is not given to idle and boastful talk. Consequently, when he announces that by the invention of a boat supported above the water by gliding planes he has made possible the building of ocean liners which may easily reach a speed of one hundred miles an hour, even conservative men are ready to believe the statement.

To cross the Atlantic in thirty hours is the goal at which Mr. Hewitt is aiming... with the added marvel that seasickness also will be relegated to the limbo of forgotten horrors, because it will no longer be possible! ...the only problem that remains at present is that of the propeller... "

(Below) "Ocean Liners With Water Wings," *Everyday Mechanics*, Oct 1930, Volume 2, No. 7, p.279.

"Europe in two days is the aim of the designer of this novel hydrofoil ocean liner. Small wings, like those on an airplane, immersed in the water cause the huge boat to rise as it accelerates in speed until it virtually leaves the water - only the keel and wings being submerged... this ship may not be as comfortable as the present liners, but it will save time."

(Above) Armagnac, Alden P. , "100 Knot Liner Has Sea Wings," *Popular Science* March 1959, p106-113

"An ultra-fast new way to travel, in vessels that ride high above the waves, is promised by the conquest of the sea's speed limit." Transocean A-Liner - atomic propulsion is entirely contained in a pod attached to the center strut... supercavitating foils, while inefficient at moderate speeds, begin to show spectacular superiority above something like 70 knots...."

(Left) "Ship on Stilts Rides Above Waves," *Popular Science*, Jan 1936

"Ocean liners on stilts are proposed by a Portland OR inventor to offer safety and comfort at sea. His design envisages a craft supported by buoyant submarine pontoons, in such a way that the hull itself rides clear of the water. its elevation above the surface would be sufficient to allow heavy waves to pass beneath it without striking it, eliminating the buffeting to which most ships are subjected in bad weather. Rolling and pitching would thus be minimized. The propeller is situated nearly amidships, and the tunnel-like enclosure formed by the surrounding pontoons is declared to give high propulsive efficiency."

The NEWSLETTER

International Hydrofoil Society

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

Editor: John R. Meyer | Fourth Quarter 2008 | Sailing Editor: Martin Grimm

RODRIQUEZ NEWS

Contributions by Lorenzo Bonasera and Martin Grimm

Lorenzo Bonasera (IHS Member) has been tracking recent developments at Rodriquez Cantieri Navali SPA and has the following to report.

Having the opportunity to get close to the Messina yard, he took several pictures of the development of the ALISWATH being carried out there, one of which is shown here.

The hull is still in the same position as it was on last February, but the yard seems to be going ahead in working on the superstructure part of the craft.

Photo Courtesy of Lorenzo Bonasera

ALISWATH Upper Hull Under Construction

Continued on Page 3

SUSTAINING MEMBERS

YOUR 2009 IHS DUES ARE DUE

See Full Announcement on Page 2

INSIDE THIS ISSUE

PRESIDENT'S COLUMN

To All IHS Members

Its that time of the year again, so Season's Greetings to all. I hope that you all have a joyful and safe Holiday Season.

IHS Members in the Washington, DC area were fortunate to be able to attend a Joint Meeting of the IHS and the SNAME SD-5 Panel on 1 October. The presentation was "NATO Fleet Composition, Capabilities, and Design" by Howard Fireman Director, Future Concepts and Surface Ship Design Group, Naval Sea Systems Command, 05D. He reported that NATO Member and Partner nations have increased levels of cooperation with the aim of blending capabilities to support a diverse sustainable, affordable fleet. Diversity in fleet asset capabilities is proving to be critical in providing a flexible response to traditional and asymmetric naval threats. Maritime Capabilities Group 6 on Ship Design and Mobility Capability is at the forefront in linking operators to affordable technology needed to guarantee sufficiency in current, planned and future operations. The presentation discussed the MCG/6 ongoing program of work in the parent and subordinate organizations and the multinational programs that have spawned from these activities. A copy of the presentation is available at this URL: www.foils.org/mtgpapers.htm

For the year of 2008, we have added 18 new members to the Society's roles. We started off the year pretty well, but since then, the numbers have dropped off quite a bit. So …. All members are asked to encourage your colleagues to join. Please make them aware of the IHS website and the features regarding membership.

YOUR 2009 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.

I want to remind you that you can view the Membership List by logging onto the IHS website and put in the proper password. All IHS members have been informed of this password. It is advisable for all to check the information on the List. If it is incorrect, please send changes to: Steve Chorney at this emil address: schorney@comcast.net

During this past Quarter, High Caliber Solutions (HCS) has re-started work on putting together the Newsite for the IHS mentioned in previous Newsletters. However progress has been slow and HCS is working through some of the glitches that we have observed when reviewing the "draft". I will keep you informed.

As President and Newsletter Editor, I continue my plea for volunteers to provide articles of interest to our members and readers. Please send material to me (editor@ foils.org).

John Meyer, President

WELCOME NEW MEMBERS

Dimitri G. Coclea -

Dimitri is a Russian, working for a Singapore shipyard in China. He works as an agent & translator for Yantai Raffles Shipyard (yantai-raffles.com). The yard's main direction is the offshore industry - rigs and associated equipment. But sometimes his boss is interested in other types of vessels so he constructs yachts, like his Asean Lady (http://www.twomoonbay.co.uk/yachts/Asean%20Lady.htm) and others. Dimitri has lived in Yantai, P.R.China (near S.Korea) for the last 6 years. He finds the IHS site most interesting, and visits it almost daily. He reads a "ton", thereby learning a lot about hydrofoils.

Wouter Swart Ranshuysen -

Wouter is from Holland and studied mechanical engineering at the University of Twente. He did his final assignment for a masters degree at the national aerospace laboratory.

After several jobs in the industry, he now works at the Hanze University as a project leader and PhD student. In fact it is a strange combination. His PhD subject concerns flexibility in the energy grid. Since the contribution of sustainable energy is increasing, discrepancies exist between supply and demand. As a consequence there is a need for energy storage.

Wouter is not a real specialist in boating but it is his "absolute passion". He reports that in the Netherlands, they have a challenge of solar powered boats. The website is: www.frisiansolarchallenge.com

Continued on Page 12

RODRIQUEZ NEWS
(Continued From Page 1)

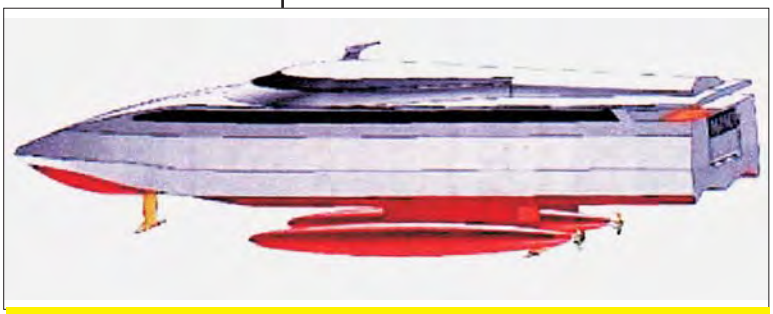
The two other experimental hulls (two different version of the "T" foil) are still slowly in progress, but it was difficult to take nice pictures because of the 3 "Oman" catamarans (one or two in civil/passenger version, and one still in the rescue/military version) which were in the front part of the yard. No Foilmaster seems to be in the current work in progress.

Martin Grimm (IHS Member) did a little internet surfing to search for recent items concerning Rodriquez hydrofoils and came across a link to a Rodriquez Cantieri Navali SPA presentation. It is entitled "Rapid Ferry-Boat with Low Environmental Impact" by Michele Sferrazza - Rodriquez Research & Innovation, given in Stockholm in April of this year. In it he discusses ALISWATH and several fully-submerged foil craft, including comparative fuel consumption figures.

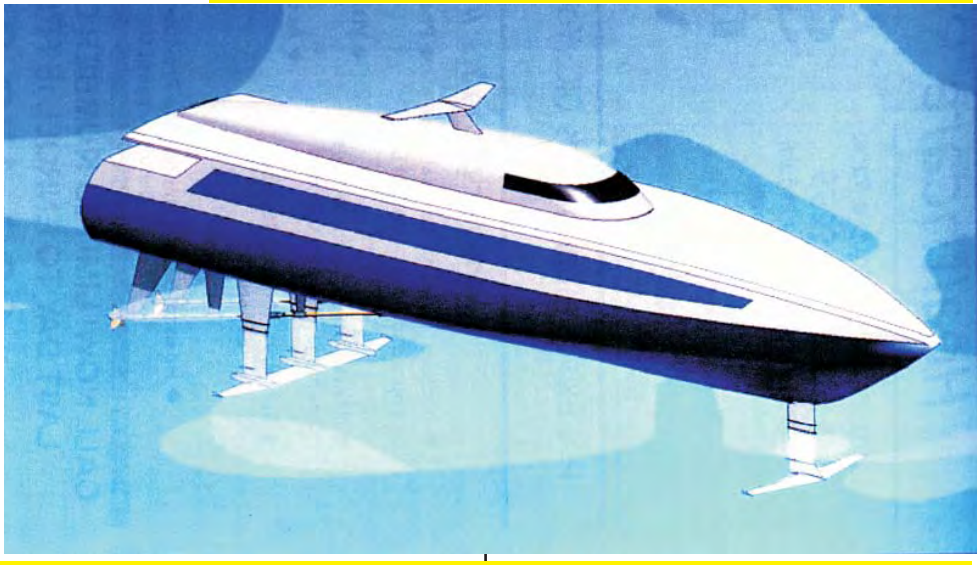
The internet link is: http://science.italianembassy.se/Sustainable%20Mobility/files/Sferrazza.pdf

In case you cannot connect, your Editor (editor@foils.org) will be glad to send you the pdf file if you have an interest in seeing the presentation.

It was informative to see that in one case the presentation still shows an early rendering of the ALISWATH when it was obviously proposed to have two submerged hulls (i.e. a SWATH configuration) rather than one, hence the origins of the name of the craft. See figure below.



Early Rendering of ALISWATH With Twin Hulls



Rendering of Rodriquez Fully-Submerged Foil Design

METEOR HYDROFOIL BOSMAN EXPRESS HAS ENTERED SERVICE IN POLAND

(From Fast Ferry International, June 2008)

A hydrofoil service between the Polish cities of Szczecin and Swinoujscie has been reintroduced this summer by Zegluga Szczecinska-Wodoloty. The vessel being operated, *Bosman Express, is* a Meteor built in 1992 that was originally imported into the Netherlands by Heyman Shipping.

The hydrofoil, then called *Flying Dutchman,* was introduced on several routes from Arnhem and on excursions around the Port of Rotterdam before becoming a reserve vessel for Fast Ferry's catamaran service between Dordrecht and Rotterdam.

Meteor Hydrofoil Bosman Express Has Entered Service In Poland

The hydrofoil had been laid up for several years before arriving in Poland in June 2007. Following a lengthy refit, it entered service on April 2, becoming the first hydrofoil to be operated on the Szczecin-Swinoujscie route since 1998.

Zegluga Szczecinska-Wodoloty has timetabled two daily return services on Monday-Friday and three on Saturday and Sunday until October 31

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METEOR
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and an additional return service each day during June 15 to August 31. Scheduled journey time for the 34 nautical miles between the two cities is 1 hour 15 minutes.

LASTOCHKA RETURNS TO SERVICE IN HUNGARY

(From Fast Ferry International, June 2008)

In Hungary, a Lastochka hydrofoil has returned to service for a third season operating with Pannon Wings on the River Danube between Budapest, Bratislava, Slovakia, and Vienna, Austria.

The vessel, *Quicksilver, is* one of only two pre-production Lastochka hydrofoils designed by the Central Hydrofoil Bureau and built in Gorki by Krasnoye Sormovo.

Pannon Wings is Operating Between Budapest, Bratislava (Pozsony in Hungarian) and Vienna

Two Lastochka-M production versions were subsequently exported to China in 2004.

Quicksilver, built in the USSR in 1986, arrived in Budapest in 2006. This summer Pannon Wings has timetabled one daily return service on Friday-Saturday during May 4-25 and October 3-November 2, and on every day of the week from May 30 until September 28.

Lastochka Hydrofoil *Quicksilver* arrived in Hungary in 2006

Scheduled trip times are 3 hours 5 minutes for Budapest-Bratislava and 4 hours 25 minutes for Budapest-Vienna. According to the operator, "Our ship is among the fastest inland passenger hydrofoils around the world, our flying speed is close to 100 km/h."

In fact, the Lastochka was designed to have a service speed of 38 knots and a maximum speed of 43-46 knots. The 31m hydrofoil has two Zvezda M470 992 kW diesels powering fixed pitch propellers and a maximum full load displacement of 37 tons. Normal capacity is 77 passengers and a crew of four.

NEW RUSSIAN OPERATOR INTRODUCES HYDROFOIL

(From Fast Ferry International, July-August 2008)

Olympia Line, a recently established Russian operator, has introduced Morye Olympia hydrofoil *Hermes* on a route in the Black Sea between Sochi and Gagra, Georgia. The 42.5m vessel entered service on July 1, 2008. Two daily return crossings have been time-tabled this summer. Scheduled journey time is 45 minutes.

Hydrofoil services between Sochi and Gagra were withdrawn in 1992 when war broke out between Georgia and the country's Abkhazia region following its declaration of independence.

Shortly before *Hermes* was introduced on the route, the Georgian government issued a warning that services using Abkhazia were banned under international law. The government officially closed every port in Abkhazia after the region broke away.

The Olympia hydrofoil is one of two delivered to Tallink Express in Estonia in 1993-1994 as *Laura* and *Jaanika* and transferred in 1997 to Linda Line. *Laura* was sold to a Bulgarian operator in 2007 and also introduced on a Black Sea route.

NEW GREEK OPERATOR IMPORTS KOMETA HYDROFOIL

(From Fast Ferry International, July-August 2008)

Production of the Kometa hydrofoil may have ceased in the USSR twenty-five years ago but the design continues to be popular with Greek operators and the latest vessel to be imported into Greece, *Iviscos*, has entered service with Sea Service.

Built in 1980 as *Kometa-16* and delivered to a domestic operator, the Kometa was purchased towards the end of last year by Sea Service, a cargo handling and vessel chartering company based in Rhodes.

Iviscos has been introduced in the Eastern Aegean, initially operating

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GREEK OPERATOR
(Continued From Previous Page)

three return services each week between Rhodes and Marmaris, Turkey.

Kometa *Iviscos* has Entered Service in the Eastern Aegean with Sea Service

Since May 1, a daily return crossing has been timetabled. The Kometa leaves Rhodes at 10:00 and Marmaris at 17:00. Scheduled journey time is 50 minutes.

Sea Service also owns a conventional passenger car ferry and acts as agent in Rhodes for Tilos 21st Century, a company that operates Brodrene Aa CIRR 120P surface effect ship Sea Star between Tilos and Rhodes. Recently, Sea Service has added a second Kometa, *Rodon,* to its fleet.

CONNEXXION WATER EXPANDS HYDROFOIL SERVICES

(From Fast Ferry International, September 2008)

Of the three companies that introduced fast ferries on the inland waterways of the Netherlands during 1998-2000, only Connexxion Water continues to operate high speed services.

A hydrofoil route along the Noordzeekanaal between Velsen Zuid and Amsterdam was launched by Fast Flying Ferries in May 1998. Two years later, Connexxion, the state owned bus operator, became a major shareholder and the company became Connexxion Fast Flying Ferries. Following a restructuring of Connexxion's operating divisions, since 2006 the hydrofoil operation has been part of Connexxion Water. Last year, Connexxion was privatized. According to the company, "On October 12, two thirds of our shares were transferred to a consortium comprising Transdev and Bank Nederlandse Gemeenten. The State of the Netherlands will be selling the remainder of its shareholding within the next five years to the consortium."

The fact that Connexxion is still operating the Velsen-Amsterdam route is something of a surprise, since in May 2006 Veolia Transport announced that it had been awarded the operating contract by the North Holland government from January 1 2008.

However, Connexxion challenged the legality of the tendering process, won its appeal and has remained on the route. The current contract covers the period until the end of 2014 and includes an option for an additional two years.

In September 2008, the introduction of Morye Voskhod-2M Klass Wszdijk has increased the fleet to five 79 seat hydrofoils. Connexxion retains *Annemarie,* one of its original three Voskhod-2s delivered in 1997, as reserve vessel and has three Voskhod-2Ms that were delivered in 2002, *Calhartna-Amalia, Karla* and *Rosanna.* In recent years, the company has sold a Meteor to Hungary, a Polesye to Vietnam and a Voskhod-2 to Malaysia, and has scrapped a Voskhod-2.

Since August 25, the Monday-Friday timetable for the Velsen-Amsterdam route has required three hydrofoils during the morning and evening peaks to maintain a 15 to 30 minute service frequency and two hydrofoils at other times. The third would provide cover during the middle of the day while the others return to Connexxion's yard in Velsen Nord for refueling and a crew change. The weekend timetables require two hydrofoils.

Annual passenger numbers on the route during the past six years have been relatively constant at 255,000-265,000, apart from a peak figure of 285,000 in 2004. This year, Connexxion Water manager Pieter de Boer is hopeful that over 300,000 passengers will be carried.

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One of Four Morye Voskhod-2M Hydrofoils Operated by Connexxion Water, Karla

CONNEXXION WATER

(Continued From Previous Page)

The reasons, he says, are extensions to the operating day introduced at the end of April, increases in frequencies at the end of April and August, and greater marketing of the service. Between May and July, there was a 25-30% increase in passenger numbers.

Each hydrofoil carries a crew of two captains and, during the summer months, one cabin attendant. New crews come on duty at about 14:00. Pieter de Boer says that 16-18 captains are required to operate the new timetable and Connexxion is currently training six more.

The fleet is maintained by eight engineering staff, including three hydrofoil specialists. This year, attention has been concentrated on preparing the latest Voskhod-2M for service. The bare hull arrived from the Morye yard in Ukraine in Apri1.

Just as Connexxion's operating experience with its three Voskhod-2s was fed into the fitout of its first three Voskhod 2Ms, the company's experience with these has influenced the fitout of the latest Voskhod-2M.

The most obvious differences are visible in the two passenger saloons, which have track mounted West Mekan ferry seats in place of the bus seats installed in the first three Voskhod-2Ms, concealed lighting and a new design of skylights.

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FOIL ASSISTED CATAMARANS ARRIVE IN TRINIDAD

(From Fast Ferry International July-August 2008)

International Broking Services reports that it has brokered the sale of three 27m foil assisted catamarans to the Government of Trinidad and Tobago. The glass reinforced plastic (grp) composite vessels were designed by Teknicraft Design and built by VT Shipbuilding in 2003-2004.

During 2004-2006 the catamarans were leased to Rapid Explorer and operated in France and the Caribbean as *HC Katia, HC Milancia* and *HC Olivia*.

Following their return to the United Kingdom, ownership of two of the catamarans passed to the finance company that had funded their initial operation. Ownership of the third vessel remained with VT Shipbuilding.

The Government of Trinidad and Tobago has acquired the three ferries for a new route along Trinidad's west coast between Port of Spain and San Ferando.

The vessels arrived in Trinidad at the beginning of July, 2008 and first services were due to be operated in August. The Government is reported to have also purchased a fourth fast ferry from an operator in the Netherlands.

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HIGH POINT UPDATE

Terry Orme (IHS Member) has written: Thank you for mentioning the HIGH POINT website in the Third Quarter 2008 Newsletter. I'll let you know when we do an update. One thing I would like to have is a guest book for the website so veterans can sign in.

Bow View of HIGH Point

After Sumi Arima's visit, we had another banner day down at the HIGH POINT with a visit from Fred Nachbar who served on HP from 1975-1977 then later as Chief Engineer from 1983 through Jan 1985. He was accompanied by another HP veteran Randy Tacey. Randy came on in 1973. We spent about five hours going over things on the ship and most important of all the Chief wants to make a trip down every so often and assist us in getting things back on line. We collectively decided that however far we get, the project is still worth it.

Stern View of HIGH Point

US UNIVERSITY TO BUILD COMPOSITE FOIL

(From Fast Ferry International, October 2008)

Western Washington University's Engineering Technology Department has received a $125,000 grant to build a composite foil system for a foil assisted catamaran that is due to be delivered to Kitsap Transit in autumn 2009.

Pacific International Engineering is contributing $100,000 of the grant and All American Marine is providing $25,000. Both the WWU and All American Marine are based in Bellingham, Washington.

According to the University, "This project is the first to be conducted in the Marine Trades Innovation Partnership Zone established recently between Western and the Port of Bellingham.

"Our goal is to cut the weight of the foil in half by using new composite materials that are lighter and stiffer than aluminum or stainless steel, which will increase efficiency and decrease fuel costs.

"The new foil will also retain its shape better at speed, further boosting fuel efficiency. The first step in the process will be the completion of a ¼ scale model. The full size foil will then be fabricated and delivered to All American by June 2009."

The design, acquisition and testing of a foil assisted catamaran to be operated by Kitsap Transit between Seattle and Bremerton for an initial six month trial period is part of a multi-year research program funded by the Federal Transit Administration.

Phil Osborne, the head of Pacific International Engineering's Coastal Projects division in Edmonds, Washington, reports, "The vessel is being brought into the research program to conduct impact assessment and to validate the modeling tools developed by the study.

"Impact studies are to be conducted on the Seattle-Bremerton route through Rich Passage, an area with very strict no-wake rules because of existing beach erosion problems.

"Pacific International Engineering's role in the project will be to install instruments in the new hydrofoil to measure its performance and compare that data to the computer modeling that has already been done. The weight reduction by using the new composite foil should allow for increased wake performance, payload, and fuel efficiency, thus reducing the overall impact of the vessel on the environment.

The design of the foil assisted catamaran, which is being provided by Teknicraft Design, has yet to be finalized as Kitsap Transit recently reduced the vessel's capacity and service speed, from 149 passengers and 37 knots to 125 passengers and 32 knots, to reduce both weight and fuel consumption and to ensure that the required low wake level would be achieved. The redesign is likely to delay completion of the catamaran by approximately four months, from June until October 2009.

DO YOU REMEMBER FHE-400 BRAS D'OR

After many years of hydrofoil development in Canada, hull construction of FHE-400 BRAS D'OR commenced in 1964 and was completed in 1967.

The surface-piercing foil system of this hydrofoil is very evident from the photo and diagrams. The main foil carries about 90% of the lift, whereas the small bow foil carries the remaining l0%. The latter is steerable and acts like a rudder for both foilborne and hullborne operations. It can also be adjusted in rake, enabling the best angle-of-attack to be selected for foilborne or hullborne operation under whatever load or sea conditions that may exist.

Canadian BRAS D'OR FHE-400 at 62 Knots

As in many hydrofoil designs, the different power levels involved in hullborne and high-speed foilborne operations dictate separate propulsion systems. For the lower-power, long endurance hullborne system,

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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

HYDROFOIL OPERATING EXPERIENCE – 30 YEARS AGO

(From Fast Ferry International, July-August 2008)

The July 1978 issue of *Hovering Craft & Hydrofoil* contained a feast of information from hydrofoil operators around the world. Even the editorial was contributed by a hydrofoil operator, Peter Dorey, the chairman and managing director of Condor. [Editor's Note: Peter Dorey was President of the IHS from 1974-1977. For more information about Peter Dorey, see Robert Johnston's article on a "Review of the First 25 Years" in the 25th Anniversary collection of papers.]

In 'Ten Years On', he wrote, "Looking back through earlier issues of 'Hovercraft and Hydrofoil', I came across an article I submitted for the Hoveringcraft and Hydrofoil Conference of May 1968.

"My article terminated as follows: 'The last word … We (Condor Ltd) are convinced that economic, developed hydrofoils will begin to appear in the fairly near future, and their ability to deal with really severe weather conditions, i.e. normal Northern European year-round weather, will make them extremely attractive to operators in that area.

"'It should be remembered that only in the last few years has it been technologically possible to get to grips with hydrofoil development in the fullest sense, and I feel that developments from now on will be akin to those of the aircraft industry in the 1930s and 1940s.'

"The last comment could have been taken to mean growth in industrial size but was always intended to refer basically to the availability of new technology offering new commercial and naval possibilities.

Supramar PT.50 *Sun Arrow* was the Last of the Type Built by Rodriquez in 1968. The Hydrofoil was Operated by SNAV for 32 years

''My company has always been consistently wrong in correctly forecasting the time required for development, which has always been much longer than anticipated.

''I remember when we purchased our first hydrofoil in 1964, I felt that the Rodriquez-built PT50 might well become obsolescent in just a few years and we therefore aimed to write her off in a maximum of eight years.

"We sold her last year and so far as I am aware, she is still trading satisfactory for her new owners. Not only that, but improved craft of that basic design are still being built today in addition to those surface piercing hydrofoils incorporating developed electronic stabilisation systems.

"In 1967 Boeing's 'Tucumcari took to the water and I find it hard to realize it is over ten years since I first set foot on her in Puget Sound and felt the thrill of fully-submerged Jetfoil travel. I remember feeling at that time that developments and their acceptance would be rapid; further, that anyone doing anything in the hydrofoil world would have to act with extreme caution from that point.

"As always, it is not a question of what anyone would like to do but what anyone can reasonably do at any given time, and although I felt sure that fully-submerged hydrofoils had an extremely attractive future, and indeed we nearly commenced trading with early Boeing models in 1972, we have not so far generated sufficient courage to take the final decision.

"It could just be that we are in a similar position to those airline companies which in the late 1950s found it hard to see the results to be gained by concentrating on jet aircraft rather than their existing piston engine models.

"Looking around the world, however, it is clear that Boeing's perseverance, combined with their technological achievements, is meeting with increasing success, and it is interesting to see that large international companies are now seriously

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30 YEARS AGO
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involved both in operating fully-submerged hydrofoils and evaluating their development potential.

"The development of my own Company has been interesting over the past ten years. In 1967, the Company carried 53,207 passengers, with a passenger mileage of 1,745,924. In 1977, the Company's 2,000,000th passenger was carried with a total for that year of 356,118 and 12,718,010 passenger miles.

''As in many other areas, hydrofoil travel in the Channel Islands area is now so much an established part of life, it is considered as a permanent and necessary method of communication. That this has been achieved entirely on own trading merits does give cause for some satisfaction. particularly in view of the scepticism which was so frequently expressed during the 1960s.

"The main thing I have got wrong over the years therefore has been the development time scale; always longer than I anticipated. However, the interest and potential interest around the world is now so obvious that an operator who misses the opportunity to develop a hydrofoil route or who does not anticipate an attack on his existing conventional routes, within the capabilities of existing and developing hydrofoil technology, may well find himself in severe difficulties in years to come."

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FOIL ASSISTED CATAMARAN DIVEBOAT ENTERS SERVICE

(From Fast Ferry International, July-August 2008)

A 15m foil assisted dive boat, *Pure Dive,* has entered service in North Queensland with Calypso Reef Charters. The catamaran, built to USL IC/213 requirements, is the fourth in the past four years designed by Sea Speed Design, built by New Wave Catamarans and delivered to the Port Douglas based operator. The installation of foils is a first for all three companies however.

Describing, Foilcat 15 *Pure Dive,* Sea Speed Design's Paul Birgan says, "The design is a new super deep vee type and utilizes the latest in carbon fibre twin foil technology developed in conjunction with Andy Dovell. The foils have been used in combination with Seafury SF 30 surface drives. which give substantial increase in speed and fuel economy over conventional propulsion systems.

Pre-Delivery Trials of Foilcat 15 Pure Dive in Southern Queensland

Two Cummins QSM 11 diesels, rated at 432 kW at 2,300 rpm, power the surface drives via Twin Disc 5114A gearboxes. Paul Birgan reports. "The top speed is over 32 knots, which is quite surprising since she is not of light weight construction, as is the case with the Sea Speed New Wave Catamaran's *Seacat Range.*"

Andy Dovell is part of Murray Burns & Dovell, a naval architecture and composite engineering consultancy based in Newport, New South Wales, that specializes in racing yacht and power boat designs.

Forward Foil on Sea Speed Design New Wave Catamarans Foilcat 15

Pure Dive is fitted out with seating for 22 divers around four tables in a single saloon that includes a refrigerator, a small galley and two toilets with showers aft. Seating for another 24 divers is provided on the aft deck, although Calypso Reef Charters is limiting the capacity of the vessel to 25 divers. Other features on board include a dive compressor and dive tanks.

New Wave Catamarans reports, *Pure Dive,* as the name suggests, is a purpose designed and built scuba dive vessel set up to operate specifically for serious divers and will travel to exclusive and pristine dive sites north of Port Douglas.

"The layout also has provision for overnight accommodation, with two double berths/lounges either side of the helm and lower cabin seats that convert to a further four double berths should the vessel be chartered for overnight trips. The vessel also has top decks with sun lounges and large, spacious upper and lower foredecks with comfortable day bed seating."

SAILOR'S PAGE

L'HYDROPTÈRE AIMING FOR ABSOLUTE SAILING SPEED RECORD

Speed sailing enthusiasts, particularly those with a passion for hydrofoil sailing should keep an eye out for news on the official website of the l'Hydroptère team:
www.hydroptere.com

The following is an edited extract from the website reporting on their latest good news:

Already holders of the absolute speed record over one nautical mile and of the 500 metre record in Category D (with sail area greater than 27.88 m^2) since April 2007, Alain Thébault and his team with l'Hydroptère have just improved their performances and established two new records (pending ratification by the World Sailing Speed Record Council):

- an average of 42.98 knots* over one nautical mile.
- an average of 46.30 knots* over 500 metres .

l'Hydroptère Foilborne in its New Speed Sailing Configuration.

Accomplished off Napoleon Beach at Port-Saint-Louis-du-Rhône, with a northwest wind blowing at 28 knots and a small swell of 0.6 metres, in the presence of Christophe Simian, WSSRC commissioner, these performances show l'Hydroptère's increase in power since being reconfigured specifically to make attempts at speed sailing records. Alain Thébault and his crew composed of Jean-Mathieu Bourgeon, François Brillant, François Cazala, Damien Colegrave, Jérémie Lagarrigue, Adrien Lombard, Sébastien Stéphant and Jacques Vincent, are satisfied with this training session. They are taking the time to fine-tune l'Hydroptère, whose performance

Head-on View of l'Hydroptère

improves with each sailing session. "We have had good weather conditions to improve our own records, but unfortunately they have not been sufficient to take on the absolute speed record over 500 metres. What is more, the swell has forced us to rein in the boat", concluded Alain Thébault on return from these record runs.

With these two new records under their belt, the Hydroptère Team is, step by step, drawing closer to their goal: to break the absolute speed record over 500 metres.

Overhead View of l'Hydroptère

Already, in a recent sailing run on October 4, 2008, l'Hydroptère achieved a top speed of 52.86 knots for a short period. However such instantaneous high speeds do not qualify the craft for a record as speed sailing record measurements are based on the average speed over a distance of at least 500 metres.

Also reported on the comprehensive l'Hydroptère website is news that Alain Thébault's second book, "Le Mur du Vent" (or "The Wind Barrier") is available for sale from 23 October 2008. In this new book, the designer and pilot of the hydrofoil trimaran shares the full story of this extraordinary project in images.

More than 200 illustrations recount the journey of Alain Thébault, a tenacious and passionate man who dreamt of "making a boat fly" one day. The author shares his experiences, the long road to make his dream come true and the story of a project over 20 years.

The title, "Le Mur du Vent", perfectly illustrates the current project of the flying trimaran, the first sailing boat to cross the legendary

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L'HYDROPTÈRE
(Continued From Previous Page)

50-knot barrier, attaining a top speed of 52.86 knots. Accompanied from the start of the project by the greatest marine photographers, Alain Thébault has, through this collection of photos, brought to light the poetry of his carbon bird. "Writing this book, finding these photos once again, was like clambering into an attic and finding a hoard of lost memories. I wanted to open the trap door and hear the creaking hinges of memories, poke my head in to discover what lies behind these photos, under the dust of audacity and humility". From the book: "Le Mur du Vent", published by Éditions La Martinière.

KITESURFERS TAKE OUT ABSOLUTE WORLD SPEED SAILING RECORDS

The Lüderitz Speed Challenge held in Namibia during September - October this year at an ideal speed sailing site, saw several kitesurfers break the outright speed sailing record. At the same time average speeds of over 50 knot on a 500m course have been exceeded for the first time, not only by one participant, but three. These speeds are yet to be ratified by the World Speed Sailing Record Council (WSSRC). Sebastien Cattelan of France was the first to achieve a speed in excess of 50 knots with a run at 50.52 knots. He held this record for only 24 hours before compatriot Alexandre Caizergues exceeded this with a maximum of 50.57 knots (93.65km/h) as well as achieving two other runs over 50 knots.

American Rob Douglas set a new world record in the first few days of the Lüderitz Speed Challenge at 49.84 knots before topping this with a speed of 50.54 knots placing him second overall in the event which closed on 9 October. After the end of officially recorded sailing runs on the last day, Sebastien Cattelan and Rolf van der Vlugt from the Netherlands stayed out to see what could be done as the wind picked up further in the late afternoon. On GPS they reportedly both significantly exceeded the current records, with Cattelan achieving over 60 knots peak speed, and 54 knots average over a 250m distance.

Kitesurfer Alexandre Caizergues at Speed During the 2008 Lüderitz Speed Challenge

This is the second year the event has been held and it is planned that a similar event will be staged again at Lüderitz next year.

Lüderitz is recognized as the best speed sailing site for kitesurfing, and will likely soon also reach this status for windsurfers. There are a number of reasons to this:

1. Wind blows strongly and consistently, in the same direction, from August to March every year.

2. The run is situated at the bottom of a lagoon, and is very flat with ideal water conditions.

3. The ideal angle to the wind to reach very high speed in kitesurfing or windsurfing is considered to be around 140 degrees. This is the exact angle on the run at Lüderitz.

For more details of the 2008 event, including results and photos see: www.luderitz-speed.com

Prior to these new records being set by kitesurfers, the absolute sailing speed record had been held for a number of years by windsurfers.

While the records at the event are yet to all be ratified by the WSSRC, On 4 October, John Reed, secretary to the WSSR Council announces the ratification of an initial new outright world speed sailing record as follows:

Record: Outright Sailing Speed Record by a Kitesurfer Amundson Custom Kite Board. 7m Crossbow Kite

Name:	Robert Douglas USA
Dates:	19th September 2008
Start time:	15:16:32.65
Finish time:	15:16:52.15
Elapsed time:	19.5 seconds
Distance:	501 metres
Current: *	0.1 knot
Wind:	40/45kts SSW
Average speed:	49.84 knots

* The speeds over the course are corrected for current.

For more details of ratified speed sailing records see the WSSRC website at: www.sailspeedrecords.com

WELCOME NEW MEMBERS
(Continued From Page 2)

The participating teams come from all over the world. In fact one can compare the challenge in the Netherlands with the famous solar challenge in Australia for solar cars.

The last few years Wouter has done a lot of research on small boats. His one goal is to win the Frisian Solar Challenge and beat the technical University of Delft. In the Netherlands this University is seen as the best naval University. But he is sure that if he does his work well he can beat them.

As can be seen on the website there are different classes. He and his colleagues participated in the A class. The A class uses standard solar panels. They deliver about 800 W and the mass is 80 kg (costs 3.000 Euro). In this class they have won in 2008.

The technical University of Delft participated in the C class and used Ga-Ar solar panels as used in space and very costly.

Wouter challenged a famous ex-astronaut Wubbo Ockels professor at the Technical University of Delft to participate also in the A class with the standard panels. He promised to do that. So now they have to prove that their design will be better. He has done some calculations on hydrofoils and is sure that their solar boat with a combination of foils can beat the Technical University of Delft . Wouter will keep the IHS informed.

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DO YOU REMEMBER FHE-400 BRAS D'OR
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fuel weight is a critical factor which made the selection of a high speed diesel engine a logical one. A Paxman 16 YJCM diesel rated at 2,000 hp drove two three-bladed propellers on pods mounted on the main anhedral foils. These 7-foot diameter, fully-reversible, controllable-pitch propellers, 30 feet apart in the lateral direction, provided excellent maneuverability at low speed through differential pitch control.

Weight of the ship was 200 tons, had a length of 151 ft., and a main foil span of 66 ft. The foilborne propulsion system consisted of a Pratt & Whitney FT A-Z gas turbine engine, rated at 22,000 hp, driving two fixed-pitch, three-bladed propellers 4 feet in diameter. BRAS D'OR arrived in Halifax, Nova Scotia on 1 July 1968 to begin a long series of trials. From September of 1968 until July 1971, when the trials terminated, the ship logged 648 hours, 552 hullborne, and 96 hours foilborne. The most operationally representative trial was a 2,500 mile voyage to Hamilton, Bermuda, and Norfolk, Virginia, in June 1971.

The FHE-400, although no longer operational, remains even today the most sophisticated and advanced design of a surface-piercing-type hydrofoil. Its design and extensive trials program contributed significantly to the technical data base and this was invaluable in complementing the U.S. development program.

This has been extracted from the book "Ships That Fly". More information is available by clicking on: http://themeyers.org/ShipsThatFly/. Also a very comprehensive description of FHE-400 can be found in a book entitled: "The Flying 400 - Canada's Hydrofoil Project", by Thomas G. Lynch, published by Nimbus Publishing Limited, Halifax, Nova Scotia, 1983.

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