The NEWS LETTER

International Hydrofoil Society

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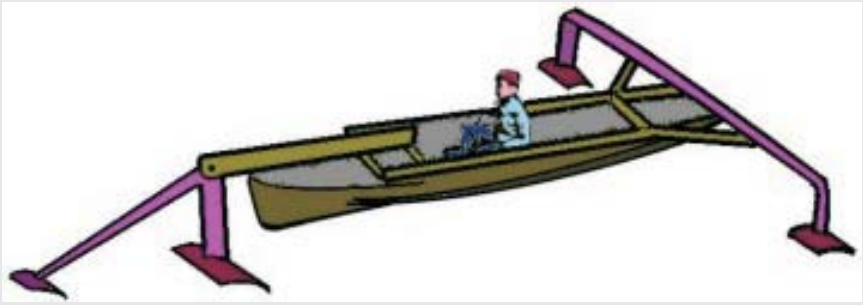
PERSONAL HYDROFOILS

By Ray Vellinga, IHS Member

In America, the first hydrofoil may also have been the first *personal* hydrofoil. In 1895 the Meacham brothers of Chicago began work that culminated in their 1913 patent of a submerged hydrofoil system. It was flown by one person.



Perhaps the first Personal Hydrofoil

Roll is controlled by the "milk stool" system. The foils are located on three corners and act as legs of a stool. You may recall, a similar system was used by Chicago's O'Leary family. However, the true innovation of the Meachams' design is the front foil's height-finding mechanism. A forward reaching surface-follower is linked to the foil's angle of incidence.

Significantly, similar systems appear in some present-day personal hydrofoils, such as the High Flying Banana (Hifybe). In contrast, for roll control Hifybe uses outboard flippers, similar to ailerons, extending from the main foil. Hifybe, in its present form, was first flown in 2007. It was preceded by personal hydrofoils of varying successes. Other examples are the Hi-Foil, Dynafoil, and the OU-32. See Hifybe at: http://www.youtube.com/watch?v=TViDOm9HQsw

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SUSTAINING MEMBERS

YOUR 2011 IHS DUES ARE DUE

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PRESIDENT'S COLUMN

To All IHS Members

All in all, IHS has had a good 2010, and I am looking forward to another decade of progress and service to the hydrofoil community. Many thanks to Frank Horn for taking on the task of setting up and manning an IHS booth at several American Society of Naval Engineers (ASNE) meetings in the Washington DC area this past year. This has exposed the Society to a wide audience and resulted in recruitment of new members. Joel Billingsley has been instrumental in making the arrangements with the ASNE for IHS to participate on a no-cost basis.

Although sign-up of new members slowed down recently, the year as a whole wound up with 13 new members. As always, all members are asked to encourage 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 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

YOUR 2011 DUES ARE DUE IHS Membership options are: US$30 for 1 year, $56 for 2 years, and $82 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.

I cannot over-emphasize the development, along with High Caliber Solutions, Inc. of New York, of a significant addition to the IHS website. It is called: **Hydrofoil World.** The site is designed to be instructive and informative to a wide audience, particularly those not familiar with hydrofoils and the technology, along with others who are interested in the history of hydrofoils. Please log onto the IHS website: www.foils.org and click on: New! Visit Our Virtual Hydrofoil Museum Hydrofoilworld.org I hope you find it interesting. Also, please spread the word by sending this message to family and friends.

I want to remind you that IHS annual dues increases to $30 effective 1 January 2011. We are still offering multi-year dues payments: $56 for 2 years and $82 for 3 years. In the meantime all members can still take advantage of the 2010 multi-year payment arrangement until December 31, 2010. There will be no change in Student annual dues of $10.

As your President and Newsletter Editor, I continue my plea for volunteers to provide articles that may be of interest to our members and readers. Please send material to me (jr8meyer@comcast.net). I will be pleased to hear from you.

John Meyer, President

WELCOME NEW MEMBERS

R. Cameron Ingram

Cameron Ingram joined Lockheed Martin Corporation in February 2005 as the Business Development Principal for Maritime Systems & Sensors (MS2) in the Tidewater region. He serves as the company's primary connection to the Departments of Defense and Homeland Security in the Hampton Roads Maritime arena.

A career Naval Officer, Cameron Ingram served in Surface Combatants in the Atlantic and Pacific Fleets. His Surface Warfare experience includes the largest nuclear powered cruiser, USS LONG BEACH (CGN 9) and the smallest and fastest patrol hydrofoil missile combatant, USS AQUILA (PHM 4). He commanded the guided missile frigate USS DOYLE (FFG 39) and the AEGIS cruiser USS LEYTE GULF (CG 55) which deployed with America's first responders immediately after September 11, 2001. Ashore, Cameron Ingram served on the principal staffs of the Chairman of the Joint Chiefs of Staff, the Secretary of the Navy and the Chief of Naval Operations. He was a Master Training Specialist at the Surface Warfare Officers School serving in the Command Department. His final active duty assignment was Deputy Commander & Chief of Staff, Naval Surface Force, U.S. Atlantic Fleet.

A Carolina native, Cameron Ingram graduated from the University of North Carolina, earning his Commission through the Naval Reserve

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PERSONAL HYDROFOILS

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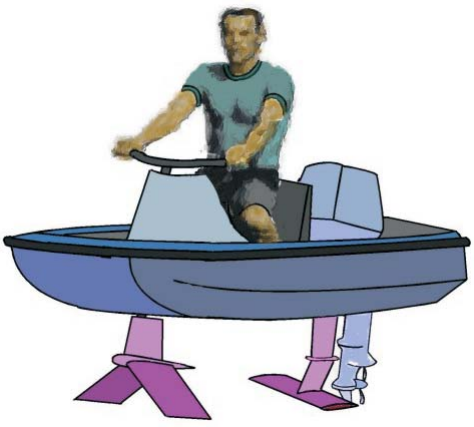
Hifybe Hydrofoil

Hi-foil is marketed in the late 1960s, before the success of the relatively simple personal watercraft like the Jet Ski and the WaveRunner. I happen to be traveling through the United Kingdom when the first production model of Hi-foil was completing trials. A brief visit to the test site is rewarded with a test ride. Perhaps the test is not of the boat, but of me. Could the boat be flown by the typical man off the street? I find it easy to control roll by tuning the inverted "V" front foil into the direction of the roll. Bike riders call this "turning under the fall". The height of the front foil is regulated by variable submersion of the inverted V-foil.



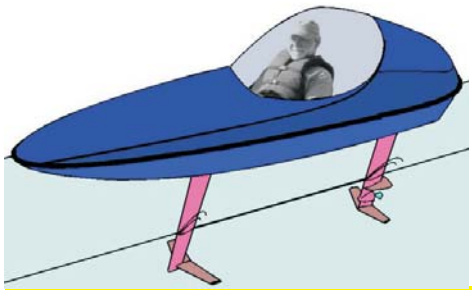
Hi-Foil

Soon thereafter in Southern California, Dynafoil enters into production. It uses a variable angle of incidence front foil to control height. The height sensors, located on the front strut, provide additional lift when dropping below cruise height. Turning under the fall provides roll control. The Dynafoil is a commercial success and sells over 500 units in 6 years. See the Dynafoil here:

http://www.youtube.com/watch?v=HgXbfAkBuiU

The Dynafoil

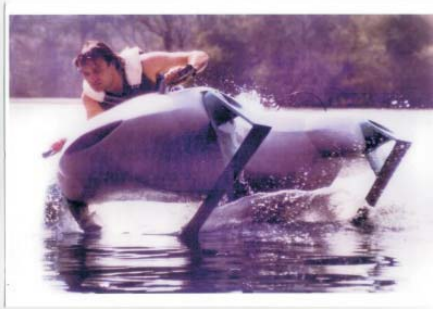
The most sophisticated and exciting personal hydrofoil is the OU51 and OU32. It is the most popular video in the "Hydrofoil" series of 18 on Youtube. It has attracted over 900,000 viewers. It is designed by Kotaro Horiuchi, IHS member, when chief design engineer for the Yamaha Motor Company. The OU-32 uses a variable incidence front foil linked to a trailing wand that is attached to the front strut. This boat also "turns under the fall" and is capable of changing course with a 45 degree bank. A distinctive feature is its water-jet. The OU-32's production is cancelled because of economic recession. See the OU32 at: http://www.youtube.com/watch?v=wObflyTPLvM



OU51 Hydrofoil

Personal hydrofoils are exciting, and they are fun to fly. They are a delight to spectators. Within limits, they go faster on less fuel than many boats of the same size. The ride is smooth through choppy water. These boats provide an authentic experience of flying but are much safer than small aircraft. Why aren't any of these thrilling boats currently in production? That is the question.

Prior to 2001, another IHS member, Graeme Vanner, along with his partners Steve Gresham, and Gavin Cawood created the Manta Foil. It is distinguished by the pilot's prone position and the surface-piercing hydrofoils fore and aft. The designers' intentions were to fine-tune the prototype and then join forces with an established manufacturer. The craft can be seen flying at: http;//www.youtube.com/watch?v=ovHAyKpHViU



Manta Foil piloted by Gavin Cawood

Ray Vellinga is author of "*Hydrofoils: Design, Build, Fly*", available at Amazon.com

CROSSING THE COLUMBIA RIVER BAR ON HIGH POINT

By Joel Roberts, IHS Member

[This is the second part of the article appearing in the 4th Quarter 2010 Newsletter.]

High Point's superbly capable executive officer, Chief Boatswain's Mate (BMC) Benjamin F. Woods, Jr. relieved the Officer of the Deck (OOD). As the Special Sea and Anchor detail OOD he would also serve as helmsman and lee helmsman – meaning he would actually steer the ship and control the throttles. Our navigator, Chief Quartermaster (QMC) Ancil S. Hatton, was there to make sure we all knew our local landmarks and courses. Mr. Vern Salisbury, our Boeing Technical Trials director (a superb sailor, aviator, and test pilot of FRESH-1), was also in the pilot house. The remainder of the ship's crew, (not mentioned by name in the interest of brevity – but all key stalwarts in our small team), were at their stations on high alert. **We would cross the bar foilborne!** Foilborne operation would give us the greatest steering control, power, and momentum over the most treacherous area on the bar. Our navigation plan was relatively simple, enter the channel on a course of 045 deg using the Cape Disappointment visual range markers, and radar range to Cape Disappointment for a distance of 2.16 nm (roughly 3 min 40 sec foilborne). The end of this leg would position us between the North and South Jetties. Our second, and more challenging, leg required us to come right to a course of 080 deg for 1.5 nm (2 min 30 sec foilborne) and maintain course using the visual range markers which identify this leg of the channel as the Sand Island Range. At the end of this leg we would make a wide starboard course change to 130 deg into the Desdemona Sands section of the ship channel. Our intended track was marked by red (right hand) channel buoys numbered 2, 4, 6, 8, 10, 12, and 14. Given the sea conditions, we had no assurance that these buoys were in their charted locations. In fact, the seas were such that we might stay true to our intended track across the bar and not see many of them; worse yet, none of us dared acknowledge the danger of colliding with one. We were now at the point where we had considered all the "known risks"; the "unknown unknowns" would not reveal themselves until we made our commitment. Throttles were advanced abeam of red approach buoy #2 and we were foilborne. The ship was steady and we gained confidence as we obtained a steady visual hold on the Cape Disappointment range markers. Everyone in the pilothouse breathed a "sigh of relief" each time we passed and made visual identification of each numbered red buoy to starboard. Our "countdown" had begun. "Red buoy 4 abeam to starboard" the lookout reported. "Red buoy 6 abeam to starboard", and so it went. We were all anxiously searching ahead for red buoy number 8. This buoy was our "**success buoy**". It would signal completion of our approach on the Cape Disappointment range, mark our intended 35 degree course change to starboard, and allow us to visually line up on the "Sand Island range". We had been foilborne 5 minutes (our calculated time on this leg) on the "Cape Disappointment range", and were desperately searching for buoy #8. As if by magic, buoy #8 appeared less than a hundred yards ahead and slightly to starboard – perfect! This event marked the end of our successful approach to the bar. We were now centered in the channel between Cape Disappointment to the North, and Catsop Spit to the South – fully committed. I casually stepped across the pilot house until I was standing behind BMC Woods. "XO isn't it time for our 35 deg course change?" I whispered in his ear. Chief Woods and I had developed the habit of whispering to each other when things were tense in the pilothouse, and we did not want to alarm anyone within earshot. "I've got the helm in the stops to starboard and she is not responding" he whispered in reply. This was not good news to say the least. We could plainly see large waves breaking on rocks ahead, and not too far away. My first thought was "What in the world is going on?" I suddenly observed that we were "no longer foilborne". "We can't be aground – there was no impact!" I thought. My head was spinning. When I looked dead astern, the answer was staring me in the face. A huge wall of water was astern of us, and lifting our stern. I wondered if it would submerge our turbine exhausts which were located in our transom. When I looked forward, a wall of water rose high above our bow! We were in the trough of one of the largest waves I had ever seen.

High Point Crossing the Bar

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CROSSING THE COLUMBIA RIVER BAR ON HIGH POINT

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High Point was literally held captive in the trough of this giant wave with turbines at full power, and no chance of going foilborne, or coming right to the next leg of her track. Our options had dwindled down to three: (1) cross our fingers; (2) hold our breath; (3) Pray! Within seconds that seemed like an eternity – the wave flattened out, the ship's head altered course to starboard, and we were once again foilborne. After we gathered our wits about us, we steadied up on the Sand Island Range visual markers, and were relieved to discover that we were still in the ship channel.

Columbia River Approach Guide

We began a shallow turn to starboard for the third, and final, leg of our bar crossing – course 131 deg in the Desdemona Shoal portion of the ship channel. The fury of the Columbia River Bar was now astern of us and we landed the ship to taxi the remaining distance to Astoria. What seemed like an eternity had only been 6 minutes since we escaped the wave which pulled us off our foils, and ironically, carried us safely over the bar.

After tying up at our berth in Astoria, we secured the Sea and Anchor Detail, and set the regular in-port watch. Those of us who did not have duty went out to dinner in Astoria. After being seated, we relaxed, and looked around to savor our "dry land" surroundings. Satisfied that we were alive and well, we ordered drinks and reached for our menus. As we picked up our menus, our gaze was captured and held in morbid fascination by our placemats. The placemats depicted a chart showing the locations of all ships that had been sunk on the Columbia Bar over the past 100 years. All of us stared at these placemats in our own private moments of silence. Two things were spinning around in my head: (1) gratitude to "Mother Nature" for releasing Highpoint from that wave"; (2) A quote attributed to Sir Winston Churchill - "There is nothing more exhilarating than having someone shoot at you and miss".

HIGH POINT PLEA

By Dr. Terry Orme

Please check with my son Terry Orme at herrhetzer@hotmail.com for news and updates on his active restoration of the USS High Point PCH 1. He resides in Portland Oregon and has been the full owner since 2005, works on the boat full time, and is totally dedicated to it's eventual flight. He is now engaged in the hullborne status, the gen-set and insuring the integrity of the valves for sea-water cooling. He can tell you more about the progress. We are also very interested in pictures that may have been taken inside the High Point during her various deployments, particularly the engine compartment and the foundation supports for the ship's service gen-set located centrally in the engine compartment and the auxiliary John Deere gen-set located on the forward starboard aspect in the engine room. We have a full set of schematics for the boat but those two plates are missing from the over two thousand in the set which we have put on a retrievable disc.

Fortunately, my son is insistent on total originality in every important aspect of the boat. We however, will certainly update all the ship's controls concerning the turbines, hydraulics and steering etc. I'm sure Terry will cooperate with your project in any way he can as the High Point is truly a pivotal vessel in the development of the discipline.

REMEMBERING DAVE KEIPER AND *WILLIWAW*

Part 2 by Jim Rudd, 28 January 2010

In the last Newsletter we included a message posted by Jim Wrenn recounting of his time with Dave Keiper This issue we include a more recent message by Jim Rudd with a further memoir related to Dave Keiper and *Williwaw*:

I sailed the return trip to San Francisco in 1971. People are still in awe when I tell what I remember of the trip. I was two years out of Vietnam, I'd been surfing on Kauai getting my head straight again. Swam out and talked to Dave when I heard he was looking for a person to crew on the trip to San Francisco. He took me out a few times and taught me to sail. We made the trip in 21 days. No motor or transmit capable radio. I had to row against the tide once we were in the San Francisco Bay to stay off the rocks.

I'm thinking I frustrated him a bit. I sailed like I surfed. No eye for a guided course. I rode the *Williwaw* for speed the compass was second-

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REMEMBERING DAVE KEIPER AND *WILLIWAW*

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ary. The *Williwaw* was most fun in a low pressure system we hit. I would hold tight against the wind climbing swells, at the top I would come off a bit and fly weaving down the backside. On one occasion I buried the bow half way up to the mast in a cross swell at the bottom, I think it nearly threw Dave out of his bunk. I thought he was going to throw me out of the cockpit…

Then there were the no wind days and especially the nights. The ocean so smooth you were engulfed in stars. There was a trailing of phosphorus spanning the beam of the boat as something passed close underneath. The heaven and sea opened up and engulfed my soul taking up parts of me that would forever be theirs and keep those parts safe from the firmament.

When entering San Francisco bay in the early morning's dawn light I could hear the city pulsing and moaning out across the water - my first instinct was to turn and sail back out…

One regret in my life is that I lost touch with Dave in the blind passions and pursuits of youth.

RADIO CONTROLLED HYDROFOIL MODEL 'CARTON ONDULE'

By Hans Jorgen Hansen

The photos show the hydrofoil model named 'Carton Ondule' built by International Hydrofoil Society member Hans Jorgen Hansen of Espergaerde near Copenhagen, Denmark.

The model is a semi-scale representation of the Supramar PT 150 Mk III built to a scale of 1:25. This was developed with reference to Jane's Surface Skimmers. While the hull and superstructure are very much based on the PT 150, the foil arrangement is more akin to a Rodriquez RHS 160 or RHS 200. The hull is around 1520 mm long and 300 mm wide. The model has a mass of 11520 grams when complete with the set of eight NiCad batteries alone weighing some 2400 grams while ballast water in plastic bottles adds a further 3000 grams. This mass would correspond to 180 tonnes at full load, and brings the model to the waterline Hans Jorgen intended it to operate at. This full loaded displacement reported for the PT 150 is 165 tons so it is apparent the model has no problem operating beyond the scaled weight of its full size counterparts. In fact 'Carton Ondule' has been ballasted to a total mass as high as 12000 grams, and even with this substantial weight the model still becomes foilborne. To prevent the model from sinking if it becomes flooded, expanded polystyrene foam is also added inside the hull.

Carton Ondule Hydrofoil Model

The method of fabrication of the hull is quite unusual in that cardboard is used as the basic building material. In fact, the name of the model is based on its use of cardboard (Carton) and the French word for waves (Ondule). Once the cardboard shell of the hull is assembled and stiffened where necessary, the inside of the hull is coated with fibreglass and polyester resin. In the process, the resin soaks into the cardboard leading to a tough waterproof shell. The exterior can then be lightly sanded to smooth the surface before it is painted. The entire superstructure is likewise constructed of cardboard and can be lifted off the hull to give good access to the battery packs, motors and radio control gear.

Carton Ondule hydrofoil model showing foil and propulsion arrangement

The bow foil is of a surface piercing 'W' configuration with an overall span of 640 mm and chord length which originally varied from 46 mm at the centre to 115 mm at the foil tips. When foilborne, the submerged portion of that foil has a span of about 450 mm. This foil provides the main longitudinal and lateral stability for the model. The stern foil is also of a surface piercing arrangement with a '__/' geometry so this also contributes to the stability of the model when foilborne. This has an overall span of 430 mm and originally had a constant 50 mm chord length. Both the bow and stern foils are manufactured from 3 mm thick solid aluminium alloy strips filed back to form streamlined hydrofoil profiles. In recent years, Hans Jorgen has experimented with reducing the chord length of both the bow and stern foils with the aim of reducing frictional resistance and hence increasing maximum speed. The bow

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RADIO CONTROLLED HYDROFOIL MODEL 'CARTON ONDULE'

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foil chord has therefore been reduced to 20 mm over its centre portion increasing to 80mm further outboard. Likewise, the stern foil chord has been reduced to 23 mm at its base increasing to 35 mm near the tips. With these modifications, the model can travel at about 15 knots.

The bow foil is attached to the hull via three alloy struts. The outboard struts are rigidly connected to the hull while the centreline strut is simply bracketed to the keel of the hull without being fastened to it. This strut therefore simply helps to support the hull weight while the model is foilborne.

The bow foil assembly was originally intended to have an adjustable incidence angle, which could be controlled by a motor driven actuator. This was subsequently found to be an un-necessary complication and so the bow foil incidence angle is maintained by a simple fixed link between a control horn attached to the bow foil and a bracket inside the hull. This arrangement also serves as a weak link that will fail should the model run aground.

The stern foil assembly is connected to the hull via an aluminium rectangular hollow section cross beam. The two outboard struts fabricated of polycarbonate are connected to the port and starboard ends of this beam. A single centreline polycarbonate rudder also transmits the hull weight into the aft foil. The chord length of the rudder has also been reduced in recent years in an effort to increase the speed of the model.

Originally, Hans Jorgen had intended to power the model using a chain saw engine. This proved to be somewhat difficult and so he decided instead for it to be powered by a pair of Tamiya RX540VZ Technigold electric motors. Reduction gears with a toothed belt drive are fitted between the motors and the propeller shafts. The reduction ratio was originally 1:2.66 however this was later modified with new gears to become 1:2.90. The gear wheels were manufactured by Hans Jorgen using his own lathe. In more recent years, the motors have been replaced by LRP V10 type which are double wound with 11 turns (article no. 5711). The propeller shafts are 3 mm diameter piano wire which is thinner than the scaled dimension of the shafts of a PT 150. This helps to minimise hydrodynamic drag. The shafts are supported at the gearwheels adjacent to the motors, as they pass through the stern tubes, at an A bracket supporting each shaft and at bossings attached to the trailing edge of the stern foil. The shafts run in Teflon bronze bearings manufactured by Hans Jorgen with the aid of his lathe. In way of those supports, the shaft is built up to 4 mm diameter using stainless steel tubing which has been glued to the shafts. Elsewhere the steel shafts are painted to prevent rust. Each shaft originally drove a two bladed 45 mm diameter Graupner propeller with a high pitch ratio. For the faster model with its modified foils, 42.5 mm diameter Graupner propellers of medium pitch are instead fitted. Four sets of 7.2 Volt Sanyo 1500 mAh NiCad batteries supply power to each of the motors, providing 6 Amps current.

Control of the model is through a two-channel Futaba radio control unit, one channel for speed control the other for steering. This same unit is also used on Hans Jorgen's smaller 'El Foil'. The receiver is a Futaba FP-R102JE type, this being powered by the same battery pack as for propulsion using battery elimination circuitry (BEC). To cope with the large current flow, each motor has its own electronic speed controller, these being LRP F1 Pro Reverse Digital types (article no 8336). These controllers each have their own receivers and are fitted with similar crystals. The single servo on board the model controls the rudder through a straightforward pushrod protruding through the transom.

The model was built between 1981 and 1999 though it was largely complete by 1985. It continues to be used from time to time. The model has an endurance of some 45 minutes on the full set of batteries.

This is one of several hydrofoil models that Hans Jorgen Hansen has built or started to work on. For more details, Hans Jorgen Hansen can be contacted by writing to him at: Sondermarken 76 I t.h; 3060 Espergaerde, DENMARK

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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

MANU WAI - A CLASSIC PT20 SURVIVES

Update via Garry Fry, IHS Member

I have been run off my feet over the last few months attending to my Rodriquez PT20 Manu Wai. Progress has been slow although I am now very close to getting the engine fired up for the first time in quite some years. Next challenge is to return the hydrofoil to class, however this would only happen if work and finances are found for the boat. I am including some photos of the re-launch in October last year after "Manu Wai" spent 3 years on the hardstand at a wrecking

yard in Sydney. Due to planned redevelopment of the site, the hydrofoil had to go back in the water before all work was finished and it is now more difficult to complete the work, basically single-handed, with the vessel on a mooring.

Editors note: Garry Fry obtained Manu Wai from New Zealand where it had originally operated. After many years of operation, it had been rebuilt and redesigned in New Zealand in a VIP configuration. Unfortunately, the hydrofoil then ran aground damaging the foils and slightly damaging the hull. It was in this condition that Garry obtained the hydrofoil and had it shipped over to Australia in the late 90's for repairs. The intention was to operate the vessel commercially as a tour and charter vessel on Sydney Harbour, which occurred for a period. However in recent years, Manu Wai had been laid up.

Separately, Garry has posted some hydrofoil footage on YouTube of Manu Wai and the former Sydney PT50, RHS150 and RHS160F hydrofoils which include Fairlight, Long Reef, Curl Curl and Sydney on Sydney Harbour back in the 80's. Search on www.youtube.com for videos posted by seapilot64.

MAPC UPDATE

By Mark Rice, President

Maritime Applied Physics Corporation (MAPC) has renewed its Sustaining Membership in the IHS for 2010. The company continued its growth during the economic recession. Our personnel recently traveled to China as part of a Maryland business delegation and discussed hydrofoil ferry service between Baltimore's sister city (Xiamen) and Taiwan. This was our first attempt to do business in China and we were extremely impressed with the construction and growth in the four cities that John Doran, our Business Development Manager visited.

Our attempts to promote hydrofoil ferry service on the Chesapeake Bay have been slow to develop. A significant effort was spent as we briefed eight different state offices and legislators. At the end of this process, the State Department of Transportation declined to apply for federal funding for a Chesapeake Bay ferry demonstration.

We have an operator in New York that has expressed interest in hydrofoils for service from the Jersey shore to Manhattan. We hope that this will develop during 2011. We also have a prospect for a hydrofoil crew boat with one of the largest crew boat operators. While our efforts to build a hydrofoil larger than the two 40-foot boats built to date, we are committed to this path and will continue to seek the buyer who is willing to "buy before riding."

In 2010 we had export business in Scotland with new emerging prospects in Ireland. MAPC recognizes

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MAPC UPDATE

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that the exports need to be a growing part of our manufacturing business and we are working to expand our overseas work. We currently have six production contracts and 11 R&D contracts. Our office in Maine continues to grow with work for Bath Iron Works. Our employee ownership program continues to expand with MAPC's founder ownership projected to drop below 50% in 2011. Efforts are underway to grow the company's next generation of leaders as the graying of the first generation continues. The company will continue to seek opportunities to transition R&D work into high technology production work. Revenues for 2010 will be over $14M when compared with $11.7M in 2009. For more info, visit: www. mapcorp.com

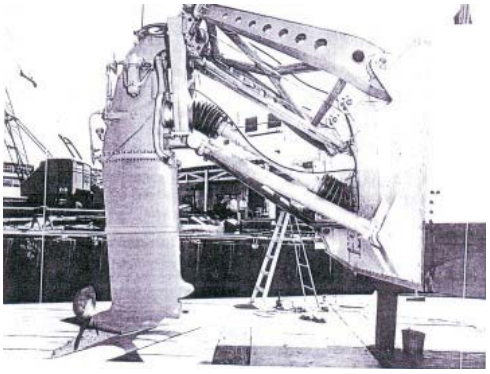
DO YOU REMEMBER - AMPHIBIOUS HYDROFOILS?

By John Meyer, from "Ships That Fly"

A significant phase of hydrofoil development during the 1950s and early 1960s was the design and construction of a number of Amphibious Hydrofoils. This development grew out of a desire of the Marine Corps to increase the speed of approach to landing on the beach. They noted that these speeds during the Korean War landings had not changed perceptibly since William the Conqueror headed for a beach in 1066. As a result, a program was initiated in 1954 to evaluate hydrofoil-supported landing craft. One of these was known as "*HALOBATES",* designed and completed in 1957 by the Miami Shipbuilding Corporation. One version of the craft is shown here with "feeler" arms adapted from the Hook system. The name, *HALOBATES*, was suggested by the Marine Laboratory of the University of Miami, since "halobates" is a sea going insect which has forward extending feelers. The hydrofoil HALOBATES, a modified small landing craft, was 35.5 feet long with a beam of 11.7 feet and a full load displacement of 31,000 pounds. A 630 hp gasoline engine provided power for the craft that demonstrated speeds up to 34 knots in 5-foot waves. The design was complicated by the use of many ball and screw actuators necessary to provide retraction of the foil and propulsion system for the landing craft requirement. However, in spite of its relative success, this configuration led to a comment which in essence said: "If this is the way hydrofoils are to be built, we have no use for them in the Navy!" The feeler concept was certainly objectionable, and so, feelers went their way.

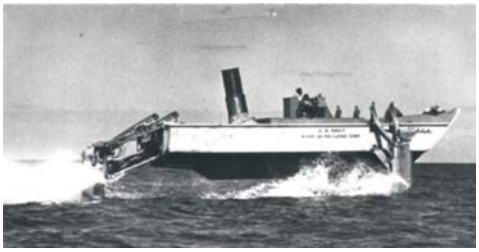
Halobates with feelers

An interesting aspect of the *HALOBATES* design was associated with the landing craft requirement. Not only did the foil and propulsion systems have to retract, but they were to continue to operate during the retraction process, that is, the craft was to be capable of flying continuously from relatively deep water up to the point it became hullborne as the water became very shallow. The aft propulsion "out-drive", shown in the accompanying picture, had not only to provide thrust during retraction, but remain steerable at all times.



Retractable Propulsion System

Because of objections to its feelers, *HALOBATES* was reconfigured with an electronic automatic foil control system. The feelers were removed and a step-resistance incorporated along the leading edge of the two forward struts. This feature provided a height signal, based on wetted length, to the autopilot, which in turn controlled foil lift. Also, it was decided to replace the reciprocating gasoline engine with an Avco T-53 gas turbine engine providing about 1,000 hp.



Halobates without feelers

The photo here shows the reconfigured craft. Note that what appears to be a smokestack is not a steam boiler, but the exhaust duct for the gas turbine. The gas turbine installation in *HALOBATES* marked a notable technological "first" for hydrofoils in particular, and in the marine field in general.

[More to come in the next NL]

SAILOR'S PAGE

Kite Surfers Regain World Speed Sailing Record

A number of kite surfers have regained the outright world speed sailing record over 500m during the 2010 Luderitz Speed Challenge in Namibia.

Initially, Alexandre Caizergues regained the record achieving an average speed of 54.1 knots (100.19 km/hr)* over 500 metres on 12 October 2010 with his kite and board. The record was previously taken from him on 6 September 2009 by the French hydrofoil trimaran l'Hydroptère when it attained 51.36 knots over this distance.

Rob Douglas speed sailing at Luderitz

Photo by Adrien Freville (www.byadrienfreville.fr)

The new record was attained during his first run for the day with 40-45 knots of breeze blowing along the coast. At the end of the 500 metre straight run, he was clearly delighted to discovering that he'd broken the 100 km/hr sailing speed barrier (corresponding to 54 knots) along a channel dug out parallel to the beach, which facilitated achievement of such sailing speed records for kite and wind surfers.

Each year the Luderitz Speed Challenge attracts the World's top kite and wind surfers for a month-long event. The French kitesurfer had already previously been the outright world sailing speed record holder when he achieved an average speed of 50.57 knots over 500m on 4 October 2008 at the same venue. This was increased by him to 50.98 knots on 14th November 2009, but not enough at the time to regain the outright record.

After this first run Alexandre Caizergues was quoted to say: "It's phenomenal! I've excelled myself. I feel like I've done something crazy! I knew I had the ability to get back the outright speed record under sail but to go this quick is something else. We had very good weather over this fantastic spot in Namibia. I've still got more in me too. We can go even quicker over the coming weeks…". Indeed, this is what subsequently occurred.

On 28 October 2010 the wind again blew up to 45 knots and the organizers decided to build a retaining wall at the end of the channel to keep the water in at low tide. This paid huge dividends and many records were smashed.

Final places posted on the Luderitz Speed Challenge website (www.luderitz-speed.com) indicate that the speed was increased several times over the duration of the challenge:

Rank	Name	Nation	Speed (Kts)
1	Rob Douglas	USA	55.65
2	Sebastien Cattelan	FRA	55.49
3	Alex Caizergues	FRA	54.93
4	Sebastien Salerno	FRA	54.28

Rob Douglas is the new outright record holder achieving 55.65 knots. These new records are all awaiting ratification by the World Sailing Speed Record Council. WSSRC observers were on site during the run.

HYDROFOIL VOYAGER PLANNED FOR RE-PUBLICATION

Via Barney Black, IHS Member

IHS members Barney Black, Ray Vellinga, Tom Speer and Scott Smith have been assisting the son and daughter of the late David Keiper in plans to re-published his book *Hydrofoil Voyager* in softcover form. It will still be some time before this is released; however when it does become available, this will be sold through http://www. amazon.com and also the BarnesandNoble.com website. No electronic versions are planned. The original book has long been out of publication.

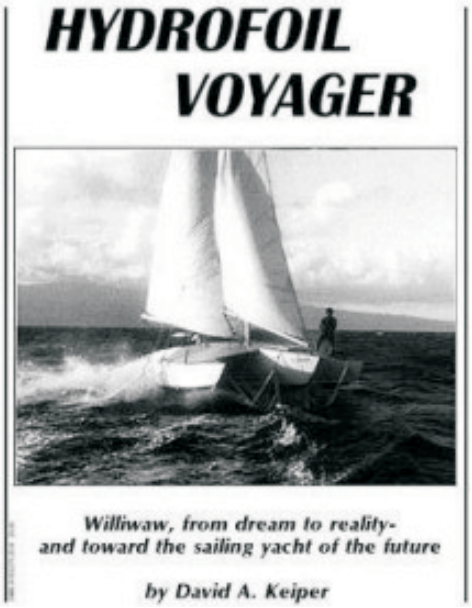
It is hoped that the video that originally accompanied the book will also be made available in some form. However exactly how that will be arranged, such as whether it is provided with the book, is yet to be determined. The current priority is to advance the re-issue of the book.

Continued on Page 11

HYDROFOIL VOYAGER PLANNED FOR RE-PUBLICATION

(Continued From Previous Page)

Hydrofoil Voyager describes how David Keiper designed and built the 31'-4" hydrofoil supported trimaran sailing yacht *Williwaw*, then logged almost 20,000 miles of cruising around the Pacific to test and fine tune the design. Keiper tells his own story, and the precision of his telling pulls you into the adventure with him.



Sadly, Dave Keiper died of a heart attack in 1998 at the age of 67 though he remained passionate about hydrofoil sailing thought his life, before, during and after *Williwaw*. "Reminiscences from people who knew David Keiper; photographs or videos of *Williwaw* and David's other hydrofoil projects; and comments about the book are solicited for possible inclusion in the republished book and/or any associated promotional material. Please contact the IHS NL Sailing Editor at editsail@foils.org. Alternatively, you may post a message on the IHS BBS, accessible from or hard copy contributions may be mailed to Barney C Black, 2008 Miracle Ln, Falls Church VA 22043-1519, USA"

UNVEILING, LAUNCH AND TRIALS OF L'HYDROPTÈRE.CH

Edited from news releases on www.hydroptere.com

Following three years of studies, design and building, on 23 August 2010 at the Décision SA shipyard in Ecublens, Switzerland, Alain Thébault unveiled the new flying sailboat *l'Hydroptère.ch*. The craft is a hydrofoil supported catamaran 10.85 metres long with a span of 10.40 metres. It consists of a pair of planing demi-hulls with removable steps, a centerline structural peak, T-foil rudder units at the transom of each demi-hull which can be raised and dihedral main foils projecting inboard of each of the demi-hulls forward. The design incorporates an accurate adjustment system for the foils. As on the 60ft l'Hydroptère, the new test craft will be equipped with a highly sophisticated on-board measurement system.

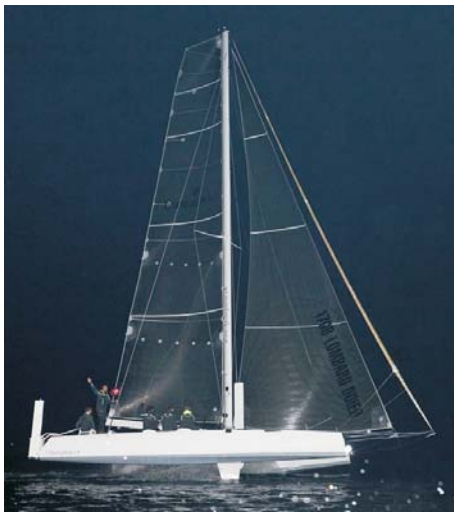
***l'Hydroptère.ch* and the Hydroptère team at the unveiling**

l'Hydroptère.ch was presented hung by a crane 6 metres over the public with the foils attached. Patrick Aebischer, supporter of *l'Hydroptère.ch*, broke a bottle of Champagne at the end of the press conference.

All the team based in Switzerland was present and a part of the French team was also there for this important event. Alain Thébault remarked: "This christening is a very important day for the team and for myself. I am proud and moved. *l'Hydroptère.ch* is the result of years of studies and sailing sessions on *l'Hydroptère* but also of the work and the commitment of an extraordinary team".

The Hydroptère project is sponsored by two major companies: Lombard Odier Darier Hentsch & Cie and the watchmakers Audemars Piguet.

As a 'lab boat' designed to conceive a future l'Hydroptère maxi, this catamaran will help test a new craft geometry and especially the configuration with two T-foil rudders. The objective of this hybrid sailing boat is to be able to sail nearly as fast as traditional yachts when hullborne while achieving higher speeds when in flight. Initially on Lake Geneva, then in the Mediterranean and abroad, *l'Hydroptère.ch*



***l'Hydroptère.ch* foilborne at night soon after launch. Photo credit: Gilles Martin-Raget**

Continued on Page 12

WELCOME NEW MEMBERS

(Continued From Page 2)

Officer Training Corps. He holds a Master's Degree in National Strategic & Security Affairs from the Naval War College and a Master of Science Degree in Management from Salve Regina University.

Cameron Ingram serves on the Board of Directors of the Surface Navy Association, Hampton Roads Chapter and the Propeller Club, Port of Norfolk. He is also the current President of the Navy League, Hampton Roads Council and is active in numerous maritime and business organizations.

In Hampton Roads, Cameron Ingram supports MS2 as the premier global provider of innovative products and solutions, serving vital defense, maritime, logistics, safety, and security needs for our nation and allies. MS2 encompasses more than 460 programs across fifty nations including Advanced Platforms, Sensors & Surveillance, Integrated Warfare Systems, Global Sustainment, Missile Defense, Network-Centric Warfare, Systems Integration and Homeland Security.

Other recent new members who have not provided Biographical Notes are:

-Terry Lee New of Virginia Beach, VA
-Andrew Vasquez of Plainfield, NJ
-Ed Johnston of Alexandria, VA
-Robert Howard of Dana Point CA
-Casey Harwood of Glen Cove, NY
-Samuel Nye of Horsham, UK
-Russell Auger of Chicago, IL
-Captain Peter Fanta of Remington, VA

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UNVEILING, LAUNCH AND TRIALS OF L'HYDROPTÈRE.CH

(Continued From Previous Page)

should provide answers to questions related to flight dynamics.

On 8th October 2010 *l'Hydroptère.ch* was airlifted by a Super Puma helicopter as an underslung load from the shipyard to Lake Geneva before being put on the water off Saint-Sulpice pier.

Alain Thébault and his Breton and Swiss crew members started sailing on Lake Geneva at the end of the afternoon the following day after a few adjustments and again the following afternoon. The initial results were promising with *l'Hydroptère.ch* quickly reaching 20 knots in 10 knots of wind.

The coming sailing sessions will be dedicated to the adjustment of the boat and to the study of her behaviour. The flying range will be extended step by step based on analysis of the data collected during each session.

Alain Thébault remarked: "Our first sailing sessions are satisfactory but we know that there will be a long period of adjustments. We will sail as long as weather conditions are adequate because we wish to discover the potential of our prototype as soon as possible".

For more information, read the news reports on: www.hydroptere.com

If you have a high-speed internet connection, you can also view an extended documentary video "the breath of a dream" related to Alain Thébault and his sailing hydrofoil projects at: www.alainthebault.com

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NEW BENEFIT

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

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The NEWS LETTER

International Hydrofoil Society

PO Box 51 - Cabin John MD 20818 - USA

Editor: John Meyer | Second Quarter 2011 | Sailing Editor: Martin Grimm

PGH *TUCUMCARI* REVISITED

Based on *Ships that Fly* by John R. Meyer and input from IHS Member Martinn Mandles

TUCUMCARI (PGH-2) was one of two patrol gunboat hydrofoils built in 1967 for a U.S. Navy operational evaluation, if not a "fly-off", between competing hydrofoil technologies. The other contender was the Grumman-built *FLAGSTAFF* (PGH-1).

Named to honor the city of Tucumcari, New Mexico, the Navy's *TUCUMCARI* was the brainchild of the Advanced Marine Systems Division of Boeing's Aerospace Group. The design of *TUCUMCARI* commenced with a $4 million contract award to Boeing in April of 1966. By July of the following year, the hull of PGH-2 was built by a subcontractor in Portland, Oregon, and then transported to one of Boeing's factories in Seattle for outfitting and testing. Delivery to the U.S. Navy at PSNS Bremerton took place on March 8, 1968.

The design and appearance of *TUCUMCARI* were drastically different from those of *FLAGSTAFF*. Instead of a conventional aircraft wing configuration, there was one forward hydrofoil and two aft foils to port and starboard. And, instead of propeller propulsion, a waterjet provided the thrust for foilborne operations of *TUCUMCARI*. The water inlets were located at the juncture of each aft strut and foil, and the waterjet exhaust nozzle

Boeing-built PGH, *TUCUMCARI*

See TUCUMCARI, Page 3

SUSTAINING MEMBERS

YOUR 2011 IHS DUES ARE DUE

See Full Announcement on Page 2

INSIDE THIS ISSUE

PRESIDENT'S COLUMN

To All IHS Members

At a Board of Directors meeting in January, the Board approved several ways of boosting IHS Membership. First, members can earn "Dues-Free Years" by sponsoring non-members. Secondly, IHS is offering new members - at no charge - an IHS CD containing all quarterly issues of the IHS NEWSLETTER. Details of these member benefits are given on page 5 of this Newsletter.

Many thanks again to Frank Horn for taking on the task of setting up and manning an IHS booth at ASNE Day (American Society of Naval Engineers) meeting in the Washington DC on February 10-11, 2011. This has exposed the Society to a wide audience and resulted in recruitment of new members. Joel Billingsley was instrumental in making the arrangements with the ASNE for IHS to participate on a no-cost basis.

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 the subject of "The SES Sea Train" presented by Dr. Robert M. Sher. He is Senior Principal Naval Architect at Alion Science and Technology, and has been at Alion (and formerly JJMA) for over 26 years.

The SES SeaTrain is an articulated cushion-borne marine vehicle consisting of multiple units connected in such a way that they can be added or removed as desired. The analogy with a railway train is clear. Its hinged connections use coupler designs based on articulated tug-barge practice. The presentation reviewed recent design efforts, experiments, and possible future developments. .

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. If you have been missed, please contact the webmaster (webmaster @foils.org).

YOUR 2011 DUES ARE DUE IHS Membership options are: US$30 for 1 year, $56 for 2 years, and $82 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.

It is advisable for all to check the information on the List. If it is incorrect, please send changes to: Steve Chorney: membership@foils.org.

The development of a significant addition to the IHS website is called: **Hydrofoil World.** I hope you find it interesting. Also, please spread the word by sending this message to family and friends.

You should have received notice that IHS annual dues was increased to $30 effective 1 January 2011. See above. So if you have not paid up your 2011 dues, please do so ASAP.

John Meyer, President

president@foils.org

WELCOME NEW MEMBERS

John G. Doran - Mr. Doran has more than forty years experience in U.S. Navy-related defense business development. After earning a Physics degree from Manhattan College in New York City, Mr. Doran joined Westinghouse Electric Corporation in 1961 as a technical sales assistant. That was followed by a tour of duty with the Navy ('63-'66) on the staff of the Commander of the Navy's Pacific Missile Range, Point Mugu, California.

Returning to Westinghouse in 1966, Mr. Doran joined the marketing department of the Oceanic Division in Annapolis, MD where he specialized in undersea systems for Navy use as well as acoustic flow measurement equipment for commercial markets, both foreign and domestic. He was Marketing Director from 1985-1999, during which time revenues increased seven-fold.

After retirement in 2001, Mr. Doran consulted with Northrop Grumman Corporation and others for several years before joining Maritime Applied Physics Corporation (MAPC) as Manager, Business Development. MAPC is a highly innovative small business engaged in the rapid prototyping of emerging technologies for defense and commercial markets. He remains there today, involved with both Navy opportunities and international commercial interests, including the pursuit of hydrofoil crew boats and passenger ferries. Mr. Doran represented MAPC at the 2010 China Business and Trade Mission.

Continued on Page 12

TUCUMCARI Revisited

(Continued From Page 1)

was centerline on the underside of the hull just forward of the transom.

Both *FLAGSTAFF* and *TUCUMCARI* were equipped with Rolls Royce gas turbine engines for foilborne propulsion. In the case of *TUCUMCARI*, a Rolls Royce PROTEUS provided 3,200 hp to give this 57-ton hydrofoil a "flying" speed in excess of 40 knots. She was 72 feet long with a beam of 35.3 feet. Her draft was 4.5 feet with foils retracted, and 13.9 feet with foils extended.

***TUCUMCARI* in flight**

One of our own IHS members, Martinn Mandles, was the first Officer-in-Charge to command *TUCUMCARI*. He, along with an exemplary crew of only 12 enlisted personnel, put her through several months of extensive sea "trials" (during which, according to Martinn, there were no "tribulations" whatsoever!).

In the photograph in the second column, *TUCUMCARI* is cutting a high speed tight circle around *HIGH POINT* (PCH-1). It might appear that they're on a collision course, but these Boeing hydrofoils (like their ancestors and descendants) could

***HIGH POINT* and *TUCUMCARI* cross paths near Seattle**

make fully-coordinated turns on a dime – in other words, without spilling even a drop of coffee!

In November of 1969, *TUCUMCARI* and *FLAGSTAF*F were deployed to Vietnam to conduct riverine operations out of Danang for utilization and evaluation in a combat environment. *TUCUMCARI's* total time underway in Vietnam was about 318 hours, 203 hours of which were foilborne; she covered a total of 9,073 nm before returning stateside in February of 1970 to the Naval Amphibious Base at Coronado, California.

Following her deployment to Vietnam, *TUCUMCARI* was deck-loaded on *USS WOOD COUNTY* (LST-1178) for transport to Europe for a North Atlantic Treaty Organization (NATO) tour. From April until October of 1971, she operated in European waters while performing numerous demonstrations and combat exercises that undoubtedly had a significant influence on the later decision to procure a NATO fast patrol hydrofoil.

TUCUMCARI chalked up some very impressive statistics during her European tour. She logged 659 hours underway, 396 hours of which were foilborne, and covered over 17,000 nm in European waters, visiting seven NATO countries (including a total of 17 port visits). These accomplishments played a major role in greatly enhancing confidence in the potential of hydrofoil ships. Upon her return from Europe, *TUCUMCARI* joined the Amphibious Forces of the Atlantic Fleet.

It was a sad ending to a distinguished career when, in November of 1972, while conducting night exercises with the 2nd Fleet in the Caribbean, *TUCUMCARI* ran full speed onto a coral reef at Caballo Blanco, Vieques Island, Puerto Rico. Fortunately there were no serious injuries to the crew. The ship was salvaged and transported to her base in Norfolk, Virginia, where it was decided not to attempt repair of the extensive damage. In 1973, the hulk of *TUCUMCARI* was transported to the David Taylor Research Center for structural and material testing.

Despite this disappointing and inauspicious finale, *TUCUMCARI* is best remembered as the foremost of all hydrofoil prototypes when it came to providing the technology and confidence that gave rise to the Navy's Boeing-built Pegasus Class PHM program.

More about Tucumcari can be found on wikipedia:
http://en.wikipedia.org/wiki/USS_Tucumcari_PGH-2

CROSSING THE BAR FOLLOW-UP

The last two issues of the Newsletter contained a fascinating story by Joel Roberts (IHS Member) of the Navy *HIGH POINT* (PCH-1) crossing of the bar at the entrance of the Columbia River following its 1971 Southern California deployment.

Subsequent to that deployment, *HIGH POINT* continued to conduct operations and demonstrations of the ship's capabilities. One of these was conducted with the Honorable John Chaffee, Secretary of the Navy, aboard. Subsequently, Secretary Chafee released a letter presenting a MERITORIOUS UNIT COMMENDATION to *HIGH POINT* (PCH-1) for service related to the ship's Southern California deployment.

THE SECRETARY OF THE NAVY
WASHINGTON, D. C. 20350

The Secretary of the Navy takes pleasure in presenting the MERITORIOUS UNIT COMMENDATION to

HIGH POINT (PCH-1)

for service as set forth in the following

CITATION:

For meritorious service from 5 January 1971 to 15 March 1971 during extended foilborne operations along the western coast of the United States. In the face of adverse operating circumstances, the officers and men of HIGH POINT carried out their highly important and sensitive mission with outstanding skill and dedication. The successful conclusion of these operations provided a most significant and vital contribution to the Navy's knowledge of hydrofoil craft, operational uses of these craft, and invaluable information required for the design and equipping of future generation hydrofoil craft. By their foresight, perseverance, and unswerving devotion to duty throughout this period, personnel of HIGH POINT upheld the highest traditions of the United States Naval Service.

John H. Chafee
Secretary of the Navy

The letter is reproduced here along with a photo showing Lt Joel Roberts presenting a PCH plaque to SECNAV Chafee.

MEMBERS: EARN DUES-FREE YEARS!

At a Board of Directors meeting in January, the Board approved several ways of boosting IHS Membership. Current members may sponsor for membership as many non-members as they wish and the IHS will allow a credit of one dues-free year for each one accepted. "Non-member" includes former members who left IHS at least three years ago and members still on the books who are in arrears on their dues for three years or more.

Simply notify IHS of the new member's name and email address, at treasurer@foils.org or at IHS PO Box 51 – Cabin John MD 20818 – USA. Your account will be credited when the new member's application is approved.

GIFTS FOR NEW MEMBERS

At the same Board meeting, the directors also approved a policy whereby if one joins IHS after 1 January 2011, they will receive – at no charge - an IHS CD containing all quarterly issues of the IHS NEWSLETTER, from its first publication in 1978 to the present – a $15 value! To expedite receipt of this valuable gift, please annotate your application with the words "New Member."

Members paying by PayPal may annotate the last page of the PayPal form at the "Optional Information" prompt (under your home address information).

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HOBIE MIRAGE DRIVE

Contributed by Martin Grimm, IHS Member

The MIRAGE DRIVE is a flapping pedal powered propulsion system for a kayak. The simple kayak was born perfect. Light, nimble, and easy to use, kayaks paddled through the ages virtually unchanged. An old design maxim says that perfection is achieved when there is nothing left to remove. The Hobie design team response? Get rid of the paddle.

Kayak with MIRAGE DRIVE

Fish-eye view of underwater fins

Underwater fins at extreme end of stroke

Welcome to the world of the Hobie MIRAGE DRIVE®. The ungainly paddle is replaced by the sheer efficiency of the pedal. With the largest human muscle group now in play, kayaking becomes easier and more efficient than ever.

Two pedals drive a pair of underwater fins – much like a penguin's flippers. Whether snapping up to speed with a quick burst or steadily covering expanses of water, the MIRAGE DRIVE allows effortless freedom and function.

Its principle of operation can be easily seen by looking at the animated image on the website. There are video clips that further illustrate how it performs.

For further information about the MIRAGE DRIVE, see:
www.hobiecat.com/kayaks/miragedrive/

The video link is at:
www.hobiecat.com/kayaks/features/miragedrive/videos/

RUSSIAN HYDROFOILS ABOUND

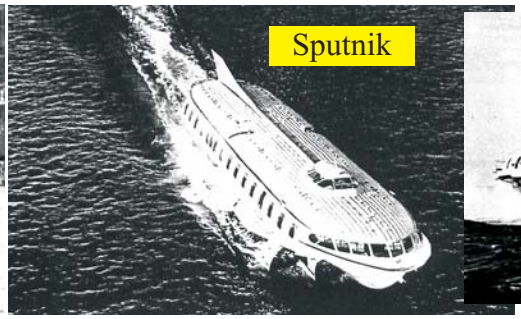
By Your Editor

I was impressed by an article appearing in the November 2010 issue of *Fast Ferry International* on the subject of hydrofoil operations in Russia. It mentioned that this past year approximately 100 hydrofoils were in service – but only a fraction of the number operating when Russia was part of the USSR.

In some areas fewer hydrofoils were operating, however, in Saint Petersburg, the size of the fleets continues to grow. The largest operator, Vodohad-Saint Petersburg has a fleet of 12 Meteors. The company continues to build up its fleet by buying Meteors from other operators. The operation continues to be profitable because of the many tourists visiting the area. Below is a montage of the many varieties of hydrofoils that have been operating in this vast country of lakes and rivers. One could say that the center of gravity of the hydrofoil world seems to be somewhere between the Black Sea and Saint Petersburg.

I highly recommend that all members add the *Fast Ferry International* publication to their library because it continues, after many decades, to publish important and interesting articles on hydrofoils and other high performance vessels.


Raketa

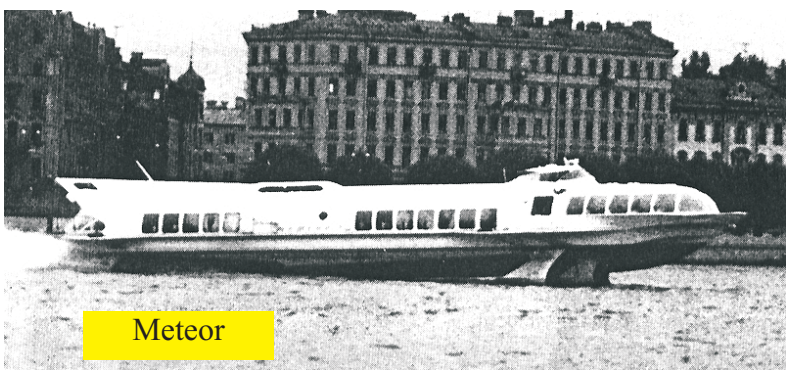

Sputnik


Vikhr


Lastocha


Cometa


Olympia


Meteor


Cyclone

HYDROFOIL DESIGN HELP!

Extracted from IHS Bulletin Board (10-30-10)

My project (mathematically model the Trampofoil (or Waterbird or aquaskipper) is facing some difficulties. I calculated the motion of the boat and rider in unsteady state. By using Runge-Kutta4 algorithm, I solved 13 differential equations. However, the results are not as expected. Both displacements and velocities don't oscillate (vertical direction). All forces don't tend to recover. I don't think the algorithm isn't incorrect. I think there is any error in the equations or geometric dimensions. However, the checking of equation system takes more time. Therefore, the first I need comparison of geometrical dimensions. I really need this because the time allowed only one month away. Please give me some reference size, such as: rear wing, front wing, skimmer, upright, curve beam, handlebar, spring...(my project: rearwing (span = 2.2m,chord = 179), front wing (span = 540, chord = 65), upright(700mm), handlebar (1m), skimmer (0.005m^2)). Please help me! Thanks so much!

Nguyen Quang Trúc

Reply by Tom Speer; (11-09-10)

From: www.trampofoil.info, "The main wing is 2.90m and the weight is about 12kg. The body mainly is made from aluminum and carbon fibre. Max speed is about 24 km/h. Min speed is about 8 km/h." (Google is your friend.) From looking at the pictures my eyeball says the chord is on the order of 0.2 m, giving it an aspect ratio of 15. These are probably the most important figures, because they establish the span loading, foil area and takeoff speed.

I doubt the choice of section shape (NACA 63-412) is very important, as all sections have basically the same lift curve slope. The big question is, "Does the foil produce too much drag for the power available?" The biggest drag contribution will come from induced drag, and the profile drag (and thus the choice of section) will be a comparatively small proportion of the total drag. It's also quite likely the NACA 63-412 will not have its classic drag bucket when operating in water, because all the people I've known that have experimented with laminar flow in water say transition occurs earlier in water than in air. XFOIL data with Ncrit=1 and the actual Reynolds number will probably come closer to the truth than the NACA wind tunnel data. The nature of the force imparted by the rider is a big unknown. I suggest solving the problem backwards - prescribe the motion, then differentiate it to determine the rates and accelerations, and solve for the force required from the rider. Then determine if the rider forces seem reasonable, and improve the model from there. Pick an average speed in the range above, say, 15 km/h. The motion will be periodic, but for an initial guess, just assume constant speed. Because the craft has a plane of symmetry, you can decouple the longitudinal and lateral-directional motions, so just concentrate on the longitudinal motion.

Since the motion is periodic, use Fourier series to describe all the motions. Start with just a sine wave with a single frequency. Each motion quantity will have the same frequency, but will have its own amplitude and phase. Start with just a sine wave with a single frequency. Add multiples of the fundamental frequency if you want to shape the motion so it is not a pure sinusoid, say, to make the peak amplitude occur earlier or later in the period.

The bow foil is a Shutt strut, which is a feedback mechanism to maintain constant height. Assume that the feedback control is perfect, which means the rest of the craft will rotate about the bow foil as the main foil moves up and down. This gives you the coupling between the craft's pitch attitude and heave. The main foil needs to have its own rotation relative to the frame, and the magnitude and phase will be determined by the stiffness of the spring and the hinge moments from the foil. I've always assumed that the foil is articulated, but it may be rigidly attached to the frame. If that is the case, it's one degree of freedom you don't have to worry about.

Continued on Next Page

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

HYDROFOIL DESIGN HELP!

(Continued From Previous Page)

I suspect the Trampofoil can be modeled with quasi-steady hydrodynamics, as it is basically a low-frequency operation. I would expect that the speed is high enough relative to the foil chord that unsteady hydrodynamics do not play a role in the sectional characteristics. The wake may have some influence, however. But the defined motion approach may include a curved wake to get the right induced velocities at the foil. A panel code like CMARC might be used to get the wake, including the starting vortices embedded in the wake due to changes in the lift. I'd start with a straight wake, however. In one month, it's better to get a very approximate answer that looks reasonable, than to do any elaborate modeling.

Finally, the Trampofoil is really the hydrodynamic equivalent to an ornithopter. I suggest searching the literature for information on modeling flapping wings for propulsion and flight.

[Editor's Note: The above is one example of how the IHS is helping colleagues in the pursuit of hydrofoil technology and thereby fulfilling its mission.]

DO YOU REMEMBER - AMPHIBIOUS HYDROFOILS?

By John Meyer, from "Ships That Fly"

[This is the second part of the article with the same title appearing in the First Quarter 2011 Newsletter.]

The second LCVP(H) hydrofoil landing craft was built by Baker Mfg. Company in the early 1960s and was named *HIGH LANDER*. It had four surface-piercing V-foils which were retractable, and it could carry a payload of 8,000 pounds to the beach at 40 knots. It was also a modified LCVP and was designed along the lines of *HIGH POCKETS* but weighed about 10 tons in the light condition.

Baker Hydrofoil, *HIGH LANDER*, LCVP(H)

During this period the U.S. Army also became interested in the potential of foils to increase the speed of their amphibious DUKW. Miami Shipbuilding, working with Avco-Lycoming, was awarded a contract in 1957 to demonstrate a "flying" DUKW. An Avco T-53 gas turbine engine was installed along with an electronic autopilot like that in *HALOBATES*. Retractable submerged foils were attached to complete the modification. Trials were run near Miami, Florida during which a speed of about 30 knots was achieved in calm water compared to the DUKW's normal speed of only 5 knots.

Miami Shipbuilding Flying DUKW

Avco-Lycoming Hydrofoil Amphibian LVHX-1

In spite of the mechanical complexity of the Flying DUKW, as well as other disadvantages the U.S. Marine Corps continued to have interest in the use of hydrofoils on wheeled amphibians. This led to their award of contracts for two competing designs of an LVHX. The LVHX- 1, was built by Avco-Lycoming, and the LVHX-2 by FMC. Both were designed to meet the same requirements with aluminum hulls 38 feet long and a capability of carrying a 5-ton payload at a speed of 35 knots. LVHX-I had a submerged foil system and LVHX-2 employed surface-piercing foils forward with a single submerged foil aft.

FMC Hydrofoil Amphibian LVHX-2 Foilborne

During the trials program that followed it finally became clear that the complexities and costs of such features as foil retraction and high speed gas turbine propulsion presented too great a penalty to pay for the increased water speed. As a result, further pursuit of hydrofoil landing craft was terminated.

SUPRAMAR PT-150 RC MODEL

This is a somewhat condensed version of an article which originally appeared in the July-August 2002 issue of 'Classic Fast Ferries'. While some more recent issues of the on-line journal are still available on http://www.classicfastferries.com, this issue is unfortunately no longer accessible online.

This very detailed 1:40 scale model of the Supramar PT-150 hydrofoil ***Queen of the Waves***, has been under gradual construction since around 1975 by Copenhagen based naval architect and IHS member, Soren Struntze. It is one of three hydrofoil models built by Soren, the other pair are based on his own design concepts rather than being scale models of existing hydrofoil types. The full scale *Queen of the Waves* was the second of three PT-150's built by Westermoen Hydrofoil, and was completed in October 1970.

A trial run of the model with the temporary superstructure

The 95 cm long hull consists of a light wooden frame composed of a keel, regularly spaced transverse frames and chine and deck edge strips covered mainly with 0.3mm thick aluminium alloy sheeting. The sheeting was attached to the frame with "blue Araldit." The window recesses for the lower cabins are neatly cut out of the alloy sheeting.

As with the full-scale PT-150's, the foils are of hollow construction with internal stiffening. Unlike the full-scale hydrofoils, which require high tensile steel for these items, the model foils are of the same aluminium alloy sheet used for building the hull. The foils were assembled with the aid of purpose built jigs to ensure correct alignment.

The bow foil of the PT-150 is equipped with both inboard and outboard flaps on the port and starboard sides. On the model all four of these flaps are radio controlled via an intricate system of mechanical linkages. For gradual turns, the PT 150 hydrofoils only employed their bow foil flaps. It was only for more rapid turning that the rudders were also deflected in conjunction with the foil flaps. The same control arrangement was incorporated in the model such that a single steering servo would initially only activate the bow foil flaps, then, as more helm is applied, the pair of rudders are also deflected. Symmetric movement of the port and starboard flaps is also possible to adjust the trim of the boat. The flaps have a range of movement from 8.5 degrees up to 15.5 degrees down and are controlled via a set of 0.5mm diameter stainless steel wires inside 2.0mm diameter (0.9mm inside diameter) nylon tubes. These flap actuation wires emerge from the hull through the cross tube connecting the foil struts to the hull. They then run down to the foil within the hollow inclined struts. The control linkages for the flaps are completely hidden. In the event of a grounding, the bow foil will rotate backwards about the cross tube which is attached to a pair of shock absorbing springs. A ratchet mechanism has also been fitted to avoid the bow foils swinging forward again after impact.

The aft foil incidence angle is fully adjustable over a range from –2 to +2 degrees. This is servo controlled via push/pull 3mm aluminium rods leading down the rudder support struts in a similar manner to that of the bow foils. The full-scale PT-150 hydrofoils had an aft foil with hydraulically controlled incidence, but in addition were equipped with an air feed stabilization system which controlled the lift generated by the foil while operating in waves.

Close-up of the bridge and crew accommodation area

The model weight is about 2.6 kg however since savings in weight are possible through changes to newer motors and batteries, ballast has been added in the lower portions of the foils to gain additional stability. Initially twin electric Monoperm Super Special motors were fitted and these were both air and water cooled. The cooling water would be drawn in from the base of the rudders on the aft foils, just as the engine cooling water inlets are arranged on the full scale PT -150. Although these motors provide sufficient power, they had lower than optimum speed making it difficult to match them with optimum propellers. Therefore they have since been replaced with Power 400 series motors.

[The remainder of this article will appear in the 3rd Quarter 2011 NL]

SAILOR'S PAGE

2011 ZHIK MOTH WORLD AND FOILING MOTH DEVELOPMENTS

It has been some years since we included an update on foiling Moth developments in the IHS Newsletter. There have been many developments since that time and it isn't possible to review them all in a short update.

The 2011 Moth World Championships were held during January from Belmont on the shore of Lake Macquarie in Australia. The major sponsor for the event this year was Zhik, a sailing clothing and gear manufacturer. It isn't often that the World Championships are held in Australia so your sailor's page editor didn't miss the opportunity to be a spectator for a day of the event.

It would be a safe claim that the Moth World Championships in recent years have attracted the largest gathering of hydrofoils in one location anywhere in the world, even if these are towards the smaller end of the hydrofoil spectrum. This year, the event attracted 109 competitors, of which almost all were hydrofoil based moths.

The field was dominated by the "Mach 2" production design (developed in Australia and manufactured in China) however other manufacturers represented at the event included Bladerider (also of Australian design originally built by McConaghy boats in China but subsequently by Topkey based in Taiwan), Assassin (New Zealand), Fastacraft (Australian design and production), Velociraptor and Full Force (both from UK but no longer producing moths). Home built foiler moths were also in attendance, as were hybrid boats featuring a combination of production and customized components. John Ilett from Fastacraft advised there are also home build moulds available in Australia and USA for amateur builders to use. Aside from these, foiler moths have also been produced by Aardvark in the UK and Sabrosa in France.

The Mach 2 design has been developed by Andrew McDougall of KA sails (who had originally been associated with the design of the Bladerider) and McConaghy boats. The name Mach 2 undoubtedly is derived from the combination of names of the designer and builder. This design has been selected by many of the top competitors in the event and it was clear from looking over the boats while on shore that significant effort has gone into refining their design to give them an edge over other manufacturers (who already had well designed and manufactured dinghies). The top 31 places in the Worlds were held by Mach 2 sailors.

One entry that attracted particular interest was that of Charlie McKee from the USA which featured a wing-sail. This was the first Moth Championship in which a dinghy with such a sail has competed. The race rules were adapted to allow for such an entry, although as a one-off for this event pending a ruling on the longer term use of wing-sails on the class. All three of the wing-sail rigs that had been brought for the competition were damaged to varying degrees during the races and so Charlie reverted to a conventional soft sail for the final races. His top placing was a 4th in the qualifying series however he was forced to withdraw from two races resulting in an overall 23rd place in his series. He indicated that the wing-sail was still at a prototype stage developed just in time for the Championships and that there had only been limited time to become familiar with using the rig. The failures were reported to all be of a similar nature and, in part, the heat build-up in the container in which the sails were shipped to Australia may have been a contributing factor. Charlie remained optimistic that such sails would be a feature of the further development of the class and took satisfaction in being a part of the evolution of the class despite the difficulties he encountered with the new sails.

The top five places in the Worlds were:

1. Nathan Outteridge (Australia)
2. Joe Turner (Australia)
3. Scott Babbage (Australia)
4. Peter Burling (New Zealand)
5. Bora Gulari (USA)

As a measure of the consistency of the top four competitors in the World Championships, they also achieved the top four places in the Australian Championships which were held at the same venue in the lead-up to the Worlds: (1) Outteridge, (2) Babbage, (3) Turner and (4) Burling. Bora Gulari has won the previous Moth World Championships in the USA in 2009.

Nathan Outteridge had performed consistently throughout the series achieving five first places in the six race Australian Championships and with results ranging between first and fourth place in all but one of the nine races in the World Championship series finals. Aside from his impressive

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performance in the Moth class, he also had earlier won the *49er* Australian national title also held on Lake Macquarie. The montage below is intended to give the reader some flavor of the 2011 Moth World Championships.

An extended commentary and numerous quality photographs by Thierry Martinez as well as video and interviews with competitors is available at: www.mothworlds. org/belmont

Charlie McKee of the USA team returns from an afternoon of racing with his wing-sail foiler Moth

Peter Barton of the UK sailing his Mach 2 during the series

Chris Rast from the USA contingent polishes his main foil with 800 grit sandpaper prior to another day of racing

Underside of Mach 2 showing foil arrangement.

Alan Goddard from Australia was experimenting with an interesting twin wand height sensing system*

The 'gull' like planform of the Mach 2 rudder foil

***. Usually the foiler moths have only a single wand to one side of the hull controlling the main foil flap.**

WELCOME NEW MEMBERS

(Continued From Page 2)

Andy Vasquez - Andy entered the Navy in 1977 out of Bayshore NY. He was stationed on ships and shore duty in Newport RI, and USS Vogelgesang DD-862, *USS MANLEY* DD-940, with a short tour on *USS EDISON* DD-946. His Shore Duty included instruction on a Propulsion Plant trainer, and Boilerwater Feedwater for all four classes (Instructor, Main, Aux and Waste Heat boilers). He earned a rating of Master Training Specialist. Then went to *USS VALDEZ* FF-1096 and *USS CAPODANNO* FF-1093.

Andy applied for and was commissioned under the LDO program. Went to LDO INDOC (Limited Duty Officer Indoctrination) and picked up his first ship as the Boilers Officer onboard *USS MISSOURI* BB-63, onboard during Desert Storm/Desert Shield. After decommissioning *MISSOURI*, he went to Newport RI. Due to manpower reduction the Navy decommissioned the Newport SIMA (Ships Intermediate Maintenance Activity). His next duty station was Chief Engineer onboard USS *AUSTIN* LPD-4 completing several inspections successfully.

Andy's final tour was as Assault Craft Two Maintenance Officer, maintaining and repairing 12 LCU's, 13 MK8. 2 PL's and Mechanical support vehicles.

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Awards earned include ESWS/SWO, (Enlisted Surface Warfare Service/ Surface Warfare Officer), Master Training Specialist, Combat Action, Southwest Asian, Expeditionary medal, 2 Navy Commendation Medals, 5 Navy Marine Achievement Medals, Expert Marksman Medal, and 4 good conduct awards.

Since retirement, he has maintained his contact and specialized in the ship repair industry, involved in main propulsion and rudder bearing installations. For the past 12 years involved in the Thermal Spray industry utilizing HVOF, ARC WIRE, and PLASMA coatings for a Sub-Safe Level one company by the Name of A & A Co. Inc as Sales Engineer.

DALE BERESFORD REMEMBERED

Kevin Beresford, son of Dale Beresford has written: "It is with sorrow that I write to inform you that our dad passed away 26 January in the early hours in his sleep. He was living with Brian, one of his twin sons, in Houston since July of last year. In the recent weeks he became somewhat weaker and we felt his time was coming soon but did not think it would be so soon.

We are grateful that he died peacefully and are also glad of the regular visitation he was receiving from family. Brian and his wife Kelly took excellent care of him and his strength was improved and his spirits increased by their care and the visitations."

Sumi Arima was told by Terry Orme that he received word that Dale Beresford (IHS Member) died in January 2011. No details were provided. Dale was a Chief Quartermaster on *HIGH POINT* at one time, and after retiring from the Navy, was a consultant to NELC. Under that contract, Dale was assigned to keep track of the PHM test and trial program.

Mark Bebar remembered that he met Dale way back in 1971 as a NAVSEC EIT during the west coast *HIGH POINT* transit from San Diego to Seattle. He was the consummate professional.

Karl Duff, IHS Member, remarked: "The remnants are 'smallifying.'"

NEW BENEFIT

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

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The NEWS LETTER

International Hydrofoil Society

PO Box 51 - Cabin John MD 20818 - USA

Editor: John Meyer | Third Quarter 2011 | Sailing Editor: Martin Grimm

HYSTU PLAYED A MAJOR ROLE

By Sumi Arima, IHS Member

Hydrofoil Special Trials Unit (HYSTU) was established on 10 November 1966 as a field activity of David Taylor Model Basin (DTMB) located as a tenant at Puget Sound Naval Shipyard (PSNS), Bremerton Washington. This location was selected due to the close proximity of the two contractors who built the hydrofoil ships HIGH POINT (PCH-1) and PLAINVIEW (AGEH-1) that were assigned to DTMB for conducting research trials.

DTMB had its name changed to Naval Ship Research and Development Center (NSRDC). Subsequently, it was decided that Admiral Taylor should keep his name attached to the model basin and thus the name was changed to David Taylor Naval Ship Research and Development Center (DTNSRDC). The field activity at Bremerton became DTNSRDC-HYSTU.

***High Point* and *Plainview* flying in formation (circa 1977)**

See HYSTU, Page 3

SUSTAINING MEMBERS

YOUR 2011 IHS DUES ARE DUE

See Full Announcement on Page 2

INSIDE THIS ISSUE

PRESIDENT'S COLUMN

To All IHS Members

As mentioned before, at a Board of Directors meeting in January, the Board approved several ways of boosting IHS Membership. First, members can earn "Dues-Free Years" by sponsoring newmembers. Secondly, IHS is offering new members - at no charge - an IHS CD containing all quarterly issues of the IHS NEWSLETTER.

As I mentioned in the last NL, IHS participated with a booth at ASNE Day 2011 meeting at the Hyatt Regency, Crystal City, VA, on 10-11 February 2011. (See article by Capt Frank Horn on page 7).

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 11 May. The subject was: "50 Plus Years of Hovercraft Development", by David R. Lavis, General Manager, Band Lavis Division, CDI Marine and Senior VP, CDI Government Services. The presentation covered the evolution of hovercraft technology from its early beginnings to its present mature state, including the major progress made in the USA over the last 15 or so years in improving operational capabilities and affordability. He reviewed recent developments and the numerous craft that have benefited significantly from these advances in technology.

YOUR 2011 DUES ARE DUE IHS Membership options are: US$30 for 1 year, $56 for 2 years, and $82 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.

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. 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: membership@foils.org

I cannot over-emphasize the development, along with High Caliber Solutions, Inc. of New York, of a significant addition to the IHS website. It is called: **Hydrofoil World.** The site is designed to be instructive and informative to a wide audience, particularly those not familiar with hydro- foils. Please log onto the IHS website and click on: Hydrofoil Virtual World. I hope you find it interesting. Also, please spread the word by sending this message to family and friends.

As your President and Newsletter Editor, I continue my plea for volunteers to provide articles that may be of interest to our members and readers. Please send material to me (editor@foils.org). I will be pleased to hear from you.

John Meyer, President

WELCOME NEW MEMBERS

CDR Joseph B. Famme USN (ret.)

CDR Famme is the principal author and president of ITE Inc., an engineering and technology consulting firm. He has a BS Degree in Industrial Management and Masters Degree from the Naval War College. CDR Famme served as a surface warfare officer with command of a Knox Class Frigate. Ashore he served as training systems acquisition specialist in the design and procurement of modeling and simulation systems. In industry with Singer Link and CAE Electronics he worked in the development of tactical and embedded ship training systems as well as automated machinery control systems for ships such the first SmartShip, USS Yorktown (CG 48) and LPD 17.

David Newborn

David is a engineer at NSWC Carderock Division and funded through the DoD SMART scholarship program to pursue a Ph.D in coastal and ocean engineering at Oregon State University. David completed a co-op educational experience at NSWCCD while completing a Bachelor of Science degree in ocean engineering at Florida Atlantic University in 2004. The majority of the co-op experience was dedicated to developing an unmanned surface vehicle concept that utilized a HYSWAS hull form. Full time employment at NSWCCD upon graduation included participation in the Navy

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HYSTU

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The charter of HYSTU, as summarized here, was to conduct full scale trials gathering data to establish correlation with model tests and computer simulations, to conduct mission trials to determine feasibility of the hydrofoil craft performing tasks in combat situations, and to provide a test bed for new or modified systems and equipment.

The ships were well instrumented with strain gages, accelerometers, gyros, etc. as well as tapping into the ship's command and control equipment to obtain data when undergoing the sea trials. HYSTU established the criteria that the instrumentation system will be recording data on tape while underway at all times, primarily to assure data is available to be able to explain the cause of any undesirable events. Most of the initial trials conducted were to understand the hydrofoil aspects of the ship such as strut and foil loadings. As these trials took place in Puget Sound and the Pacific Ocean, it became apparent that improvement of the operability and reliability of the hydrofoil ships was a major factor.

Some of the items that required attention to the original design and manufacture of HIGH POINT were the cavitation and ventilation damage to the foil/strut coatings and structure, directional stability especially under a broach condition, sea water leakage into the gearboxes, and lack of adequate living conditions for the crew. PLAINVIEW had limited operational time due to the hydraulic system, mainly because of the use of industrial hydraulic pumps that had their rating based on 10 percent duty cycle rather than the 100 percent usage required by the incidence foil system. PLAINVIEW with the conventional configuration and weight distribution of 90 percent on the forward foils created an overhang of the bow. It was determined in some model tests that the wave forces on the bow of the ship could overcome the force available of the submerged section of the tail strut acting as the rudder, thus the ship could lose directional control.

To overcome the drawbacks on HIGH POINT, Mod 1 was put on the drawing boards. The redesign utilized much of the existing components to keep the cost within affordable range. The major changes were replacing the fixed forward strut which had a trailing edge rudder to a steerable strut, lowering the gearboxes to get the foilborne propellers away from the strut/foil juncture to reduce cavitation and ventilation. The gearboxes were modified with a different shaft seal system. The mess deck originally based on a system similar to aircraft food service was converted to a more suitable cooking facility with the installation of a grill, dishwasher, and more adequate food storage. The autopilot was changed to accommodate the steerable strut and modified aft foil system providing fully coordinated turns. More details of the HIGH POINT and Mod 1 changes can be obtained from the book, "Twenty Foilborne Years" by William M. Ellsworth. (This book is on the IHS AMV CD#1).

PLAINVIEW was put into overhaul status where a completely new hydraulic system and tail strut were installed. Other deficiencies were also corrected during this period. New replacement intermediate gearboxes were designed and installed in the foilborne drive system to power the aircraft hydraulic pumps. Stainless tubing with automatic butt welding was used for the piping of the hydraulic fluid. This welding procedure was the first for a Navy ship. The success in using the automatic butt welding machine on the PLAINVIEW has convinced shipyards to expand the machine usage to boiler tubes and other time consuming pipe welding applications. A longer tail strut made out of HY130 steel was installed to assist in improving directional control.

High Point firing a Harpoon Missile (circa 1973)

After the Mod 1 on HIGH POINT and the overhaul on PLAINVIEW, reliability of the ships improved significantly to allow the emphasis of the trials to shift toward mission-oriented trials. Trials included launching of torpedoes at foilborne speeds, firing of guns and missiles including the first Harpoon missile, towing VDS (Variable Depth Sonar) and minesweeping equipment, and participating in Navy fleet exercises. The hy-

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drofoil ships were used to evaluate the use of new concepts and equipment. For example, test sections were put into the sea water system utilizing fiberglass and plastic piping for long term evaluation after laboratory tests showed promise in the use of these materials.

***Plainview* firing a torpedo (circa 1972)**

In the research atmosphere, the Navy crew assigned to the hydrofoil ships showed ingenuity in being able to devise changes to improve their performance. The sailors on HIGH POINT devised a system by placing a TV camera to record the navigation chart and a TV camera above the radar screen, merging the two images on a TV set so that the true motion radar blip showed the ship's track on the chart. The resulting data was recorded on video tape. Conditional approval, since it was not tested in a court of law, to use the tapes rather than a navigation log was obtained. This led to the development of HYCATS (Hydrofoil Collision Avoidance and Tracking System) that was used on the PHM ships.

Unfortunately, with funding constraints and high cost of operating the PLAINVIEW, the ship was turned over to Inactive Ships in September 1978. HIGH POINT became the work-horse for HYSTU in conducting trials that supported the PHM program. William Ellsworth once said: "we ought to be proud that we were able to put a new concept into the Navy fleet".

With the PHM Squadron operating in Key West, Florida, and the continued funding constraints, a decision to close HYSTU was made. A lot was learned and accomplished during the 22 years of test and trials on hydrofoils. HYSTU was closed on 9 December 1988.

[Ed Note:When I was in the Hydrofoil Office at DTNSRDC, I had occasion to visit HYSTU several times. I can echo Bill Ellsworth's remarks and add that it was hydrofoilers like Sumi Arima, Don Rieg, Vern Whitehead and several OICs like Karl Duff (IHS Member) who made it possible for HYSTU to play a major role in the US Navy Hydrofoil Program.]

BOEING MARINE SYSTEMS

By Bruce Bryant, IHS Member

This is a multi- part series of my experiences, observations and comments on my 25 years with Boeing Marine Systems (BMS) as a test engineer and manager from 1962- 1987. All personal comments are my own and do not reflect the opinions of other employees or the Boeing Co.

The Early Years

I was hired at Boeing in the spring of 1962 and since I had a BS in engineering with boat building experience I ended up at Boeing Marine Systems. Our home at that time was the 4th floor of the Puget Power Building in Bellevue, WA. We shared the floor with the SST proposal team and our big project at that time was the AGEH proposal. The Boeing version looked very much like the PHM but Grumman won the design contract and Lockheed was the builder. That summer I supported hydrofoil testing at DTMB (David Taylor Model Basin) and high speed model (FRESH-1) testing at Langley LLT (Landing Loads Track). My main job

Hydrodynamic Test System

however was focused on a boat that Boeing had built to test hydrofoil models. The Hydrodynamic Test System (HTS) was an 8-ton pickle fork hydroplane 38 feet long and 17 feet wide powered by a J-33 jet engine with 4600 pounds of thrust. The boat was built in 1960 and was undergoing model testing on Lake Washington from the Boeing Renton Plant when I arrived. The HTS had certain limitations. My job was to extend the boat's operating envelope and improve stability at high speeds. It was hard to know where to start. I made up a list of changes I thought were necessary, how long it would take and how much it would cost in a proposal. Since the HTS was needed for super-cavitation model testing, I got the go ahead with as much help and

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BOEING MARINE SYSTEMS

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money as I needed to complete the job. It took about six months to make all the modifications which included the removal of the two aft planing surfaces and replacing it with a center ski, changing the angle of attack of the forward planing surfaces and the replacement of the J-33 with a J-48 with 6400 pounds of thrust. Since the hydrofoil models were hung on a center line balance, the flow disturbed the center aft ski so we had to offset the balance two feet which was a plus for the model test operator because he could see the model better and it also reduced the pitch trim changes of the boat during test conditions.

HTS 500th run anniversary. Left to right: Walt Kelly, Bruce Bryant and Vern Salisbury

The HTS was now capable of testing sub and super-cavitation hydrofoil models up to 90 knots and had enough power to test a towed cable and depressor up to 45 knots for

Little Squirt

NSRDC (Naval Ship Research & Development Center) on Lake Washington. For the next couple of years I was the driver of the HTS and engineering manager of the Renton Test Facility on Lake Washington. Along with the HTS there was Little Squirt, built in 1962, which was a systems test hydrofoil. Little Squirt was 20 feet long and powered with a Boeing 520 turbine driving a waterjet pump and capable of 50 knots. Little Squirt had a conventional foil configuration with both incidence and flap control that was hydraulically activated by a Automatic Control System and acoustic height sensor. The facility also had three support boats, Maribo l a 25 foot cabin cruiser with a Boeing 502 turbine, Maribo ll a 31 foot Bertram, and a 17 foot Mansfield outboard with Up-Right foils. Launching and retrieving our test and support boats was made easy in Renton due to old sea plane ramps installed in the 40's and later would be used for JETFOIL and PHM programs. The Renton Test Facility was shut down in1965 and the HTS and Little Squirt were moth-balled. The 31 foot Bertram support boat was maintained and other boats were sold.

I was then sent to the MPC (Missile Production Center) where BMS had a portion of the main building and a work shop area where FRESH-1 was stored after the Navy trials were over. The main activity in 1966-68 was the patrol gunboat hydrofoil (PGH) Tucumcari program. My job as test manager was the writing and conducting all of the hydrostatic, functional, dockside and underway test procedures on Tucumcari. The hull was built in Portland, Oregon and trucked to MPC for outfitting in1966. After extensive static and functional testing the Tucumcari was finally launched in 1967 for dockside and underway testing in the MPC slip on the Duwamish Waterway. Underway testing was a routine of down the Duwamish to Elliot Bay and into Puget Sound and back again. Rough water testing was in the Strait of Juan de Fuca and the Pacific Ocean, and needless to say very long days, sometimes arriving back at the MPC after dark. Vern Salisbury was the Captain and I drove the boat during the initial trial phase, then I was Captain for Navy crew training. The PGH Tucumcari was handed over to the Navy in March of 1968. In my opinion the Tucumcari was the best hydrofoil Boeing ever designed and built although the PHM's were a close second.

In 1969-70 I was assigned to HYSTU (Hydrofoil Special Trials Unit) in various activities on High Point. Tests included NUC (Naval Undersea Center) towed cable testing, hull- borne parafoil testing and foilborne VERTREP (Vertical Replenishment) with a helicopter. High Point transited to San Diego for the SOCAL (Southern California) deployment in the first part of 1971. I did not support the de-

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ployment except I remember taking 35 mm photos of High Point from our high winged heilo-courier on the outbound leg crossing the Columbia river bar. I took the famous photo that showed High Point broaching a large wave. I often wonder what happened to all the photos and movies that Boeing took. Prior to MOD 1, I supported the base line rough water test with air photo operations.

My next assignment was Mod 1 test manager and our team wrote all the hydrostatic, functional, dockside and underway test procedures. High Point arrived at the Boeing Renton 4-81 building in the fall of 1971 where it was cribbed up for refurbishment. I remember she was almost stripped bare and old parts were all over the floor of the Building. After several months, the old parts were chopped up and new ones were taking shape. I can't remember all the changes, but the main ones were reconfigured aft foil and pod, steerable forward strut, new hullborne diesel, lots of new piping, and new props. Except for red rag in the gear box incidence PCH Mod 1 was a total success by meeting and exceeding the contract requirements. High Point Mod 1 was faster, capable of Sea State 5, and actually went where it was pointed. I spent about two years on Mod 1 and now it was time for my next assignment with Boeing Marine Systems, and that was JETFOIL.

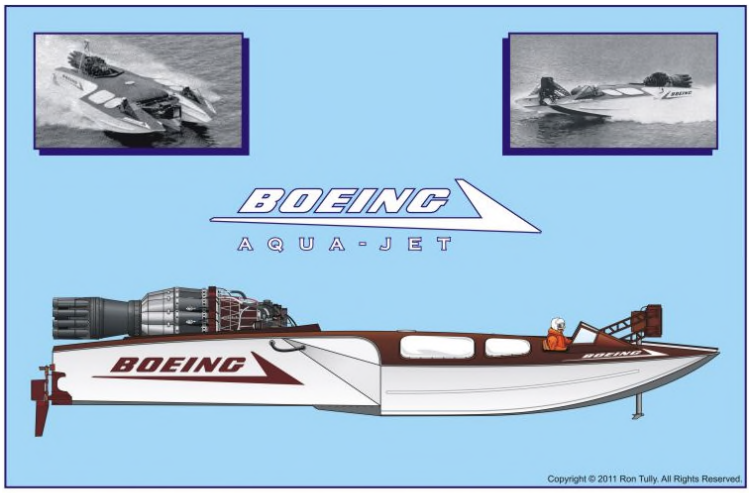
[The remainder of this article will be continued in future Newsletters]

HTS REVISITED

By Martinn Mandles, IHS Member

I would like to take the opportunity to expand upon Bruce Bryant's coverage of the HTS to make sure that the HTS receives full credit as the "starting point" from which all of the Boeing hydrofoils followed.

This is particularly appropriate especially with what would have been her 50th Birthday in June of this year, 2011. That's why I commissioned an 8-1/2 x 11 illustrated print of HTS shown here.



BOEING'S "HTS" HYDROFOIL RESEARCH HYDROPLANE

Length: 38 ft.; Beam: 17 ft.;Displacement: 6 tons
Engine: Allison J-33 Turbojet; Thrust: 4,600 lbs.
First operated on Lake Washington in Seattle in 1961
Pilot: George Adams; Co-Pilot: Martinn Mandles

You might find this hard to believe, but I've been trying to "explain" the importance and operation of HTS in simple terms for 50 years, starting in the summer of 1961 when Boeing's Public Relations Department asked me to speak to a homeowners association on Mercer Island (in the middle of Lake Washington) who were often awakened at 7:00 am on weekday mornings by HTS as we sped by their waterfront estates. There was talk of curtailing, or even shutting down, our operation.

You'd better believe that the Allison J-33 was VERY noisy, even with a sound suppressor in place. But our opponents seemed to appreciate Boeing's concern and my explanation, were fascinated that I was their kids favorite evening disc jockey in Seattle, loved the American Power Boat Association (APBA) Unlimited Class Hydroplanes that resembled HTS, and were thrilled when we brought HTS to their clubhouse dock for them to have their photos taken in the cockpits.

Another key to just-plain-folks understanding what HTS was all about was to refer to her as a "Hydrofoil Research Hydroplane" (which is what she was) instead of the "Hydrodynamic Test System" (which does NOT sound like ANY type of a boat). Most folks were familiar with "wind tunnels," so it wasn't much of a stretch to describe her function as that of a "water tunnel". This is particularly for the engineers among them: not unlike the water tunnels at David Taylor and Trondheim that were too time-consuming to do what Boeing needed to be successful in the fully-submerged, sub-cavitating and super-cavitating hydrofoil business; (or so Boeing thought at the time).

Continued on Next Page

HTS REVISITED
(Continued From Previous Page)

Of course, I was long gone to FRESH-1 and/or back to Stanford by the time Bruce Bryant spearheaded the major hull modifications and replacement of the J-33 with a J-48 that changed the maximum speed, displacement and even the paint-job of HTS. That's why there are TWO different sets of configurations and specifications for the boat, and they're most often mixed up in articles and photographs. See extraordinary illustrations of the HTS: <http://foils.org/gallery//HTS%20boeing/ HTS_ver_62.jpg> and <http://foils.org/gallery/HTS%20boeing/HTS_ver_63.jpg>

FROM THE BOARD ROOM

At the Board of Director's Meeting in January, George Jenkins proposed an IHS "reunion" in Key West, Florida, He has discussed this idea with others, including Frank Horn and Dave Patch. Dave had volunteered to organize it if it is pursued. There was discussion of where in Key West to meet, where to stay, what activities might be included. It was noted that access to the Navy base might be problematic for non-military attendees and should be looked into. Staying on the Navy base is much more economical, if it can be arranged.

The last hydrofoil reunion there was completely PHM-oriented and was completely informal, with no technical program or talks. Someone noted that many non-PHM people might need a technical program to induce them to attend. There was discussion about what a formal program might include. Frank Horn and Dave Patch are to draft an outline of what a reunion might consist of so it can be sent out to the IHS membership for comment.

Bill White provided a detailed analysis of the IHS website activities. He made special note of the interest in "Hydrofoil World" and that there were 3,394 visits to that part of the website in 2010, 69% of which were from Europe (45% of total from France alone). The site is designed to be instructive and informative to a wide audience, particularly those not familiar with hydrofoils and the technology, along with others who are interested in the history of hydrofoils.

IHS AT ASNE DAY

By Frank Horn, IHS Treasurer

The IHS participated as an Exhibitor in ASNE Day 2011, at the Hyatt Regency Crystal City, VA on 10-11 February 2011. There were over 100 exhibitors and over 1,000 attendees participating in the two-day program. During the main sessions, speakers included the CNO, Admiral Gary Roughead; Commander Naval Sea Systems Command: Vice Admiral Kevin M. McCoy; and the Assistant Secretary of the Navy (R&D) and Acquisition: the Honorable Sean J. Stackley.

The large number of attendees gave the IHS booth wide exposure. Our exhibit was a lap top presentation of a variety of military, sailing, recreational, human powered and commercial hydrofoils. The presentation was well attended, as usual, during program breaks, at which time we provided to those who were interested IHS fliers, tutorial overview pamphlets and membership applications.

The booth was manned by Joel Billingsley and Frank Horn. The interest shown in our presentation resulted in signing up new members to the Society. For example, we were located in close proximity to the Student Poster Competition which provided the students participating the opportunity to become familiar with "hydrofoils", several of whom applied for membership.

Shown here was Megan Sinesiou who is the ASNE Assistant Director for Program Operations, drawing the winning ticket for an IHS Coffee Mug. She announced the winner as Scott Weidle one of the new student members who had become a member earlier in the day.

We are grateful to the Officers at ASNE such as Megan, who have been very supportive of our efforts in making it possible for IHS to participate as an exhibitor in their professional forums.

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

BOEING AD

Contributed by Martinn Mandles, IHS Member

I recently acquired this ad from an October 1961 issue of Time magazine, and want to share a copy with all of you. You'll notice that Boeing gave the first C-135 cargo jet, as well as their proposed Supersonic Transport (SST) and Dyna-Soar manned space glider, "second billing" in this Aqua-Jet ad, which says a lot about Boeing's early expectations for fame and fortune in the hydrofoil business!

JET TEST BOAT. Boeing jet-powered research hydroplane, capable of speeds up to 100 knots, is newest addition to Boeing equipment devoted to advancing man's knowledge. Aqua-Jet will be used to test experimental hydrofoil designs. Test model is suspended between prows from structure which controls action of model being pushed through water. These hydrodynamic design studies are typical of expanding Boeing efforts in marine field, which include building a hydrofoil patrol craft for U.S. Navy.

Capability has many faces at Boeing

CARGO-JET. Boeing C-135 cargo-jet, first of 30 ordered by the Military Air Transport Service, has already been delivered. These 30 C-135s will provide MATS with work capability equivalent to 100 propeller-driven transports.

SUPERSONIC transport model being tested in Boeing wind tunnel. Boeing is investing substantial sums in supersonic transport research. Future skyliners would be able to fly from New York to London in less than three hours.

SPACE GLIDER. Drawing of Dyna-Soar, U.S. Air Force manned space glider designed to rocket into space, then re-enter earth's atmosphere for conventional pilot-controlled landing. Dyna-Soar is being developed by U.S. Air Force in cooperation with NASA, with Boeing as prime contractor for both the system and the glider.

BOEING

OCTOBER 1961

SUPRAMAR PT-150 RC MODEL

This is the second and last part of the article with the same title that appeared in the Second Quarter 2011 NL.

The battery bank of the model consists of eight SAFT KR 35/44 Ni-Cd cells, each of 2.5 Ah capacity. With the considerable weight of batteries and the otherwise light construction of the model, these cells have been placed within a spring mounted shock-absorbing frame. The battery pack will eventually be replaced with a much lighter 7.2V 1.8Ah Ni-Cd set. The changes to the motors and battery pack are hoped to give an endurance greater than the already significant 20 minutes currently achieved.

The propeller shafting is of 2mm diameter stainless steel rod. Since this is less than the scale diameter of the actual shafts, for static display the shafting will be sheathed with 3.5mm diameter aluminium tubing between shaft bearings to give the correct scale appearance. Since the foil mounted shaft bearings rotate when the aft foil angle is adjusted, an intricate cardan shaft arrangement is incorporated to accommodate this movement. On the full scale PT 150 spherical bearings and sliding shaft couplings had been fitted to accommodate shaft deflections. The multitudes of hinged shaft support struts are all faithfully recreated on the model.

Construction of the hull and foils and the installation of running gear and radio equipment was complete by 1986, though the superstructure still needed to be built. None the less, it was now possible to test the model. To ensure it was watertight, and to simulate the additional top weight and windage of the final superstructure, a temporary 'box' superstructure was constructed and fitted to the model in preparation for the trials. After experimenting with different propellers to overcoming an initial teething problem of achieving a stable ride, the trials revealed the model would run in a manner just like its bigger sisters. Smaller faster running two blade propellers of 40mm diameter and 34mm pitch gave the best results with a considerable reduction in the current drawn from the batteries over the original propellers that had been fitted. With reassurance that the model would run properly, effort has since concentrated on adding details and building the superstructure.

The model as it stood in about 1995

The superstructure was fabricated largely of balsa wood and 0.5mm aeroplane plywood, but suitably toughened with resin applied to its surface. Some portions of the upper superstructure, where scale details would be revealed, were again fabricated from aluminium sheeting. The upper aft cabin and bulwarks at the bow and upper aft deck incorporate the intricate stiffening that would have been apparent on the full-scale vessel. The mast structure was also carefully fabricated from alloy. Elsewhere miniature stainless steel handrails are fitted.

Søren has gone to extraordinary lengths to model features of the interior of the hydrofoil. Ready for incorporation in the model are rows and rows of seats painted up in the various bright colours of their time, complete with miniature headrest covers made of tissue. Steps and bulkheads in the cabins are also modelled. On the upper deck, the bridge contains a comprehensive layout of scaled instrumentation with throttle levers a clearly distinguishable feature. On the aft bulkhead of the wheelhouse, further circuit boards and a radiophone can be spotted. A crew rest area is provided aft of the wheelhouse.

Three hand made figurines representing the skipper, engineer and radio operator are at the controls. The radio operator is in a relaxed pose reclined back in his seat with feet up on the console reading the paper. Søren reports that the radio operator had the most time to spare on a typical voyage and so this was an appropriate snapshot of his life on board!

The larger windows around the wheelhouse and upper front saloon make it relatively easy to see inside those sections. Realising that it would not be as easy to see the details

Continued on Page 12

SAILOR'S PAGE

v-44 Albatross World Speed Sailing Record Project

Scanning through the January/February 2011 issue of the Dassault Systèmes Simulia newsletter, the Sailors Page editor stumbled across yet another proposal for a world speed sailing record craft. As it involved a partial hydrofoil application with a twist, we are covering it in this Newsletter. The following is a summary of information contained on the team website at: www.verneyyachts.com

Inspired by a March 2008 article in 'The Engineer' about the l'Hydroptère speed sailing team, and their preparations for setting a new world sailing speed record, Tim Clarke began working on a novel layout for a sailing boat which has led to the v-44 Albatross speed sailing project made up of a passionate design team and supported by a range of sponsors. The team consists of Tim Clarke as the founder and team leader; Steve Howell as Chief Engineer; Scott Tuddenham managing project planning, the team website, promotion and media, as well as cockpit and control system design and Yanli Shi managing weight and performance, stability and control aspects of the design.

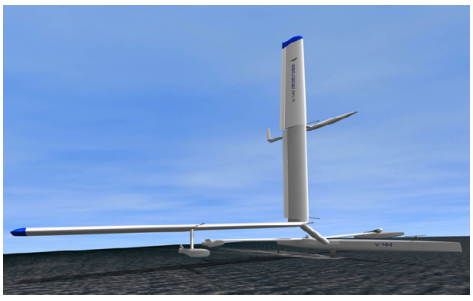


Figure 1 – Computer rendered frontal view of v-44 when under sail

Due to its unique pair of wing-sails and pair of keels, each angled at 90 degrees to one another (Figure 1 and 2) and which are able to be rotated through 90 degrees as the v-44 turns through the wind, the boat is intended to be able to sail on both a port and starboard tack. As can be seen in the arrangement drawings, when tacking, the vertical sail becomes the horizontal wing and the horizontal wing becomes the vertical sail. As the boat tacks, transposing of keels also takes place, enabling the use of a cambered rather than the usual symmetrical section on both keels. The use of camber increases the performance and cavitation inception speed of the submerged keel.

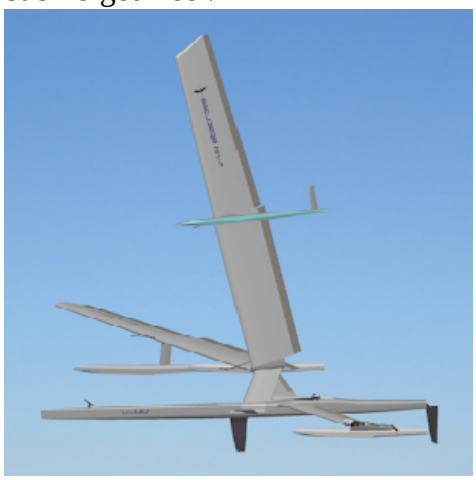


Figure 2 – Overall perspective of v-44

The overall concept has a degree of active control comparable to that of a glider. At speed, the hull rises from the water through aerodynamic lift generated by one wing acting in ground effect. Once 'flying', the skipper is able to actively control the boat in roll, height and yaw to enable 'flying' for prolonged periods with only a single keel (or dagger-board) and T-foil rudder submerged.

Yaw control will be via foot pedals controlling the rudder. Roll control will be achieved by lateral movement of a joystick, similar to the control of ailerons on aircraft. This actuates all four wing-sail trailing edge flaps, each in the opposite sense to its neighbouring flap, to effectively shift the spanwise lift distribution of each wing-sail, without transferring overall lift from one wing-sail to the other. This will minimise any lift/roll cross coupling effects. Finally, height above the surface will be controlled by fore and aft joystick movement which adjusts the overall lift on the wing-sails. Since the skipper is able to actively control the height of the boat above the water surface, he is also controlling the submergence of the keel and rudder foils. These foils are reported to be the largest contributors to the overall drag of the boat,

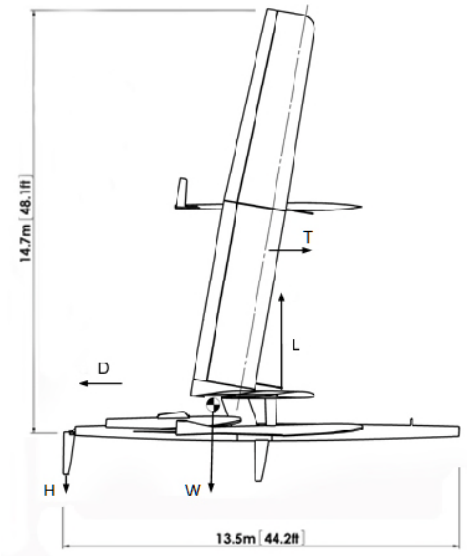


Figure 3 – Side profile of v-44 showing forces acting

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v-44 Albatross World Speed Sailing Record Project

(Continued From Previous Page

and as such controlling the height of the boat also controls speed. The team believes there is no other sailing boat which has this overall degree of active control.

Each rigid wing-sail of the v-44 is split into an inner and outer portion (four planks in total) and each portion is free to rotate or 'weathervane' independently about its longitudinal axis, aligning itself into the air stream. Similarly, each of the outriggers attached to the wing-sail is free to rotate about the same axis described above. When an outrigger is not in contact with the water, it simply 'weathervanes' or aligns into the air stream. The skipper has no direct control over the sail portion or outrigger attitude, rather this is controlled indirectly by the degree of trailing edge flap deflection set by the skipper.

The wing-sail structure is being designed such that there is no tendency for it to twist when subject to aerodynamic loads. This was considered essential to preserve the aerodynamic balance of the wing-sails.

The target ratio of boat speed to wind speed is 2.3:1. The maximum speed of the boat is expected by the designers to be restricted only by the onset of cavitation on the keel and rudder foils. This is maximized by using a cambered keel section and transposing between two keels as the boat tacks. For speed sailing record attempts, the v-44 is designed to sail in a wind blowing from the sea over a low lying breakwater to minimise sea swell.

The v-44 Albatross project will initially be developed purely in a computer environment utilising both Computational Fluid Dynamics (CFD) for the aerodynamic and hydrodynamic design and Finite Element Analysis (FEA) for the structural design. Both of these techniques are to be combined to carry out a full Fluid /Structure Interaction (FSI) simulation of the performance of the craft.

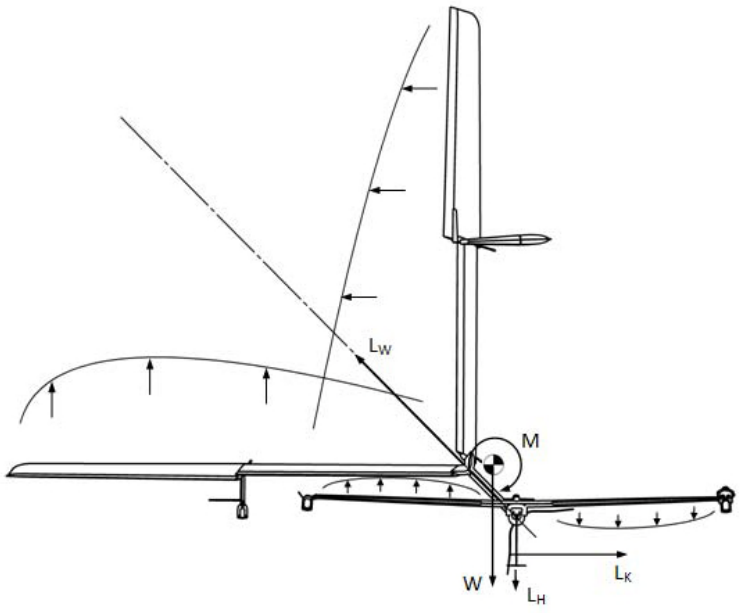

Figure 4 – Front view of v-44 showing forces acting

Stability and Control

Pitch: As with all conventional sailing craft, there is a nose down pitching moment from the high thrust line and low drag line (Figure 3). While hullborne, this is balanced by the longitudinal stability gained from trimming of the slender main hull. However, as the hulls rise free from the surface of the water, this hydrostatic pitch stability is progressively lost. Instead, when 'flying', the v-44 achieves longitudinal trim from the nose up pitch moment due to the lift from the horizontal wing-sail forward combined with the boat weight through the aft centre of gravity. Finally, down-thrust on a small hydrofoil at the base of the rudder further contributes to longitudinal stability.

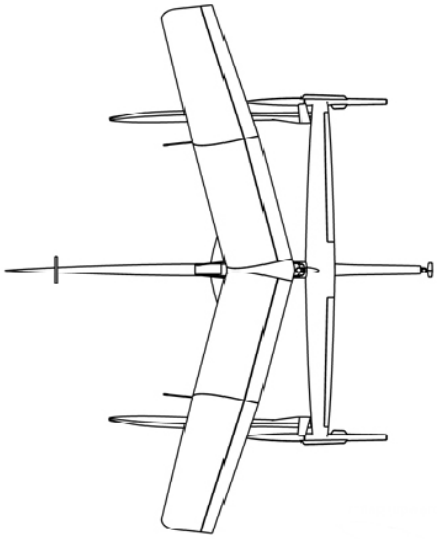

Figure 5 – Top view of v-44 showing wing-sails and keels each canted at 45 degrees

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WELCOME NEW MEMBERS

(Continued From Page 2)

Acquisition Internship Program, experimental model tests in the David Taylor Model Basin facilities, and at-sea trials of small craft and towed underwater vehicles. David's current research involves Surface Effect Ship dynamics in waves.

SUPRAMAR PT-150 RC MODEL

(Continued From Page 9)

inside the remaining sections of the model, Søren decided to make all but two of the exterior doors functional so that they can be opened to peer inside the model. All doors come complete with working door handles!

The model is designed to be able to be separated into many sub-parts for ease of maintenance and repair. Several hidden latches on both the port and starboard sides secure the superstructure to the hull and these are simultaneously locked or released via a single actuator.

One of the neat features of the model is that there are few external indications that the model is radio controlled. The first impression is that the hydrofoil is purely built as a detailed static display model. The switch for the radio control gear, the bow foil adjustment jack and the central locking actuator for securing the superstructure are all neatly hidden under a hatch on the foredeck.

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Frank Horn	Treasurer
Joel Billingsley	Secretary

v-44 Albatross World Speed Sailing Record Project

(Continued From Page 11)

Roll: As with all conventional sailing craft, there is a heeling moment induced from the vertical wing-sail side force. With the v-44, this is largely balanced by the lift force from the horizontal wing-sail. An aerodynamic moment to further oppose the heeling moment is induced through twisting each wing-sail (Figure 4). This twist lowers the centre of lift from the vertical wing-sail, and extends outboard the centre of lift from the horizontal wing-sail. A further opposing moment is induced through deflecting trailing edge flaps located on the horizontal wing which supports the aft outriggers. Furthermore, the second crew member positions himself on the windward aft outrigger to provide a more favorable boat centre of gravity position.

Why the ability to tack?

Many earlier speed sailing vessels have been designed to sail on only a single tack. However the v-44 has been designed to tack for practical reasons. A tacking boat was seen as offering more than twice as many record attempt runs for a given window of conditions. Towing a single tack boat back to the start point for each run was also seen as increasing the risk of accidents that could damage the craft. The team also considers that a tacking boat adds little complexity and that the design offers good efficiency and balance across the speed range, not just tacking ability.. Last but not least, breaking the outright speed record will be a very effective way of introducing a new class of sailing boat. A degree of automation will make it possible to use this configuration to sail longer missions and to break other records which is not possible with a single tack boat.

Specifications

Velocity not to exceed: 70 knots (80.5 mph, 129.6 km/h)
Length overall: 44.2 feet (13.5 metres)
Sail area: 26 m^2 (for each of two wing-sails)
Weight empty: 520 kg
Weight operating: 670 kg

NEW BENEFIT

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

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The NEWS LETTER
International Hydrofoil Society
PO Box 51— Cabin John MD 20818—USA

Fourth Quarter 2011
John Meyer, Editor-in-Chief
Martin Grimm, Sailing Editor
Barney C. Black, Publisher

Hydrofoil Shangri-La

By Barney C. Black, IHS Life Member

The golden era of hydrofoils ended nearly half a century ago; many of the hydrofoil pioneers who created that era have passed away; and multihull designs –not hydrofoils – characterize the fast ferries being built today. Yet there is a place – high in the Andean mountains at the remote border of Bolivia and Perú – where time has stood still, and hydrofoil ferries endure and thrive. They operate in crisp, refreshing, and thin air at 12,507 feet (3,811 m) above sea level on Lake Titicaca, the world's highest commercially navigable lake. At a length of 118 miles (190 km) and a maximum width of 50 miles (80km), Titicaca is also the largest land-locked lake in South America.

Huatajata Harbor, Bolivia

My son and I recently spent four days exploring this area, moving around the lake by hydrofoil. Normally Lake Titicaca tourists who want to ride the hydrofoils arrive and depart in La Paz Bolivia; however we flew from Lima Perú to Juliaca, then took a shuttle to our hotel in Puno. There we spent a day acclimating to the altitude… and buying sweaters (did I mention that the air is crisp, especially at night?).

(Continued on page 4)

Joint IHS / SNAME SD-5 Dinner Meeting

By Allen Ford

Each quarter, IHS and the Advanced Surface Ships & Craft Panel (SD-5) of the Society of Naval Architects & Marine Engineers (SNAME) host a dinner meeting and presentation in the Washington DC Metro area. On September 22, 2011, Mike Webster—Chief Naval Architect, Austal USA—gave an informative update on one of the most unique combatant ships being acquired, Austal USA's aluminum trimaran Littoral Combat Ship (LCS).

The LCS is designed to combat asymmetric threats such as mines, quiet diesel submarines, and fast surface craft… primarily in the littorals; however it is fully capable of open-ocean operations. The design is striking, a radical change from prior warship configurations. LCS's trimaran hullform provides advantages in hydrodynamics and in payload capacity and arrangement. Delivery of LCS 2 *USS Independence* to the US Navy in December 2009 marked the culmination of nearly ten years of development by Austal. Eleven more LCS trimarans are under contract, with the second ship planned for delivery in 2012.

LCS is an aluminum trimaran 127 m (417 ft) long, a displacement of 2,800 mt, and a draft of 4 m (13 ft). Its deck beam aft is extensive, providing capability to handle CH-53 helicopters, whose blade diameter is 68 ft, while simultaneously handling UAVs (unmanned air vehicles). The deck area is

(Continued on page 10)

Inside this issue

Online edition extras

IHS Sustaining Members

From the Author

This is the 2nd in a 4–part series of my experiences, observations, and comments: my 25 years with Boeing Marine Systems (BMS) as a test engineer and manager from 1962-1987.

All comments are my own and do not reflect the opinions of The Boeing Company or their employees or retirees.

Jetfoil Evolution *by Bruce Bryant, IHS Member*

In the latter part of 1973, I was assigned to the Jetfoil program as test manager. The test group was responsible for writing all of the test documentation. This included hydrostatic, functional, dockside and underway test procedures for all Jetfoils. The Jetfoil was intended to reflect Boeing's hydrofoil expertise based on the *Tucumcari*'s successful design and performance, but it fell short in several areas. The Jetfoil was designed by Project Group and not the Engineering Staff which was responsible for the PGH-2 design.

The Jetfoil concept was the brainchild of Bill Shultz, Chuck Coffey, and Bob Gorenstein who along with the Sales Group sold five boats for $3.5 million each on paper based on their design. Three Jetfoils were sold to PST (Pacific Sea Transport) Seaflight in Hawaii, and two short-strutted boats to FEH (Far East Hydrofoil) in Hong Kong.

My first impression after previewing the Jetfoil drawings was a bit of a shock to see that this design was contrary to what Boeing spent the last 10 years in development of state-of-art hydrofoil technology. The foils and propulsion system configuration were not like *Tucumcari*. The foils were thick and in rectangular shape which was unlike anything I had ever seen while testing hydrofoil models at Boeing. The propulsion system configuration, which was the heart of the overall performance of the boat, was again nothing like *Tucumcari*; in fact it was just the opposite. The PGH-2 propulsion configuration had two inlets (one on each aft strut) and one turbine and pump. Either inlet could supply enough water to the pump, so if one inlet un-wetted or got plugged the other inlet kept supplying water to the pump. Any debris that went through either inlet went

(Continued on page 3)

"My first impression... was a bit of a shock to see that this design was contrary to what Boeing spent the last 10 years in development of state-of-art hydrofoil technology. "

Welcome New Members

Jane Louie is the Asst. Dept. Manager for the Naval Architecture Dept at Gibbs & Cox, Inc. She has played an active role on the LCS Freedom program, with a focus on weight & stability, as well as leading various concept and feasibility studies.

Prior to her position at G&C, Ms. Louie worked as a Combat Systems Engineer for Alion Science & Technology. She designed and produced software for post-processing analyses of IR and RCS signatures data, evaluation of ship survivability and susceptibility, and graphical analysis of EMI-EMC data output.

President's Column

To all IHS members: I wanted all of you to know that I was in a very serious auto accident on June 3, 2011 and have been slowly recovering. I am now able to walk short distances unaided by a walker or cane. Most of the pain from the accident is gone, but I tire easily.

In the best interest of the IHS, I have asked Barney Black to fill in as Newsletter editor starting with this issue. I'm sure he will do a super job.

Best regards to all and heartfelt thanks for the get-well cards and messages that I received from many of you.

John Meyer, IHS President
president@foils.org

Notes from the Publisher

I am doing the paste-up and some tweaking, but John Meyer is already back at work on the newsletter soliciting and pulling together articles, news, and photos. Contributions are encouraged and needed… send questions or contributions to editor@foils.org (for sailing-related correspondence, send to editsail@foils.org).

This Newsletter edition is an experiment in converting from Corel Ventura to Microsoft Publisher. Format is modernized to support more and larger photographs and to accommodate short news and factoid blurbs to fill in around the articles. Please send observations and comments to survey@foils.org

Jetfoils are still in regular use today.
Top: Turbojet's Urzela (photo by SoHome Jacaranda Lilau)
Bottom: Kyushu Yusen's Venus (photo by Ryou Migilki)

Jetfoil Evolution

(Continued from page 2)

completely through the pump and nozzle. On the other hand, after review of Jetfoils inlet, pump and nozzle clearances, the propulsion system could have potential problems. Jetfoil had one inlet (center strut and extra drag) and two pump/ turbine combinations. When the inlet un-wetted, both turbines had the potential for shutdown. Any debris that went through the inlet could get stuck on the hull-strut interface grate or pass through the grate to get stuck in the pumps or nozzles. This basic design fault later caused many schedule delays, degraded rough water performance and created high maintenance costs.

One other thing that was a safety problem was the stairwell to the upper deck that faced the wrong way as many passengers and crew were thrown down the stairs into the bulkhead on the lower deck during rough water causing many injuries, some serious. Why these basic design deficiencies weren't pondered in the design phase is a mystery to this day since I and many other BMS employees stated their concerns as early as 1973.

When my team of test engineers was writing the test procedures we inquired and asked questions about our concerns but we were told that the boat had already passed the design approval stage and the configuration could not be changed. This answer did not alleviate our concerns about design limitations that might affect boat performance during future underway operations. This put all BMS test personal at odds with project group and sales department throughout the whole Jetfoil program.

The first Jetfoil keel was laid in the winter of 1973, and the first launch was in April of 1974 at the Renton BMS Facility at South end of Lake Washington. After several months of dockside and hullborne testing Jetfoil 001 was ready for it's first takeoff. Several attempts were made during trials in June but were unsuccessful. Changes were made to the takeoff controller, new nozzle and hull trim tabs were added before the first takeoff was finally accomplished in July.

Jetfoil 929-100-001 was to be used for initial testing and had no interiors except for some used seats for the test crew. A few initial foilborne tests and demonstration runs were made on Lake Washington before we transit-

(Continued on page 9)

Welcome New Members

Philip J Schneider retired in 2009 as a US Navy civilian ship acquisition and life cycle manager from his position as Deputy Division Director for Fleet Introduction in PEO SHIPS. He is now a consultant to the shipbuilding and support industries, focusing on high performance USN ships and craft, including the new Ship-to-Shore Connector.

Phil is a licensed Professional Engineer (PE) with master's degrees in Engineering Administration; Public Affairs; and National Security & Strategic Studies.

While in PEO SHIPS, he developed education processes across all ship classes under the PEO's responsibility. He coordinated introduction of Lean Six Sigma and fostered process improvement initiatives. Prior to this, Phil worked with fleet, shipyard, and industry to plan and execute maintenance and modernization for East Coast LHA and LHD class amphibious ships under PMS470 cog. He introduced the "A" Team concept (now evolved and expanded to TEAM SHIPS) to the Large Deck Amphibious Ship community.

Earlier, Phil was the PMS377 Acquisition/SLEP Manager for the Landing Craft, Air Cushion (LCAC) Program, covering both technical and programmatic aspects. Over his 22 years on the LCAC program his involvement spanned the transition from the full scale R&D Jeff(A) and Jeff(B) craft, through production and fleet introduction of 91 craft. Phil was closely involved with LCAC SLEP systems development, testing and service introduction.

Hydrofoil Shangri-La

(Continued from page 1)

This trip in early March was during the rainy season. Nevertheless we were fortunate to have sun all day the entire trip, with rain at night, and freedom from masses of tourists.

The next day we took a van to the border, walked into Bolivia, and met our guide Dante from Crillon Tours. After a lazy morning wandering around the picturesque town of Copacabana, we walked down to the waterfront and boarded the *COPACABANA ARROW*. After a pleasant ride, we disembarked at Sun Island (sacred birthplace of the Incan sun god) and climbed up to our hotel, the Posada del Inca, restored by Crillon Tours from an old and rambling hacienda. Porters carried our luggage and laptops, but still I got a bit out of breath hiking up the hill at that altitude in the wake of our indefatigable guide Dante.

"I boarded the hotel's 'shuttle' (a mule) and rode the rest of the way swaying in comfort."

So I boarded the hotel's "shuttle" (a mule; there are no cars on the island) and rode the rest of the way swaying in comfort. The Posada del Inca is a charming, beflowered hotel… no phones or TVs in the rooms, but incomparable views of the lake, plenty of hot water, and – get this – electric blankets on the beds. Sweet!

Darius Morgan, the dynamic owner and president of Crillon Tours in La Paz, Bolivia, assembled the 7-boat hydrofoil fleet and has kept it operating for so many years. He began in 1966 by purchasing one of the fourteen 20-passenger *ALBATROSS*-type hydrofoil ferries designed and built by Helmut Kock to serve as water taxis for the 1964 New York World's Fair. That boat rode a freighter to Matarani, Perú; it then continued by rail to its unlikely new home on the lake. Mr. Kock trained a local crew in hydrofoil operation and maintenance. They built docking facilities in the Bolivian towns of Huatajata and Copacabana, and on Isla del Sol (Sun Island).

Mr. Morgan bought a second *ALBATROSS* the following year, and later, two more. Yet Crillon Tours' success in building the level of tourism on the lake demanded even more capacity. Mr. Kock designed and built a 50-foot hydrofoil to carry 40 passengers. He completed the detail design drawings in the USA, generating a material list of over 1,400 line items. In Pennsylvania, he gathered all the necessary raw material, equipment, engines, and tools, and shipped the lot to Bolivia. Construction began in December 1975. The boat was launched in September 1976 with the name *BOLIVIA ARROW.* It was tested and outfitted, starting service in February 1977.

A second vessel of this design was planned, but Helmut Kock was experiencing problems with his eyesight. He underwent three operations on his retinas in Bolivia, followed by three more surgeries in the USA. This ordeal kept him from working for three years. Crillon's need for more passenger capacity remained. Mr. Morgan traveled to Italy and purchased a 60-passenger *SEAFLIGHT,* which he named *SUN ARROW*. Later on, he acquired a 28-foot (8.5 meters), 6-passenger *VOLGA* hydrofoil from Russia, now called *GLASNOST ARROW*. In 1983-84, Helmut Kock returned to Bolivia to stretch one of the original four boats, the *TITICACA ARROW,* by 6-1/2 feet (2 meters) to increase the passenger capacity to 30 persons.

Let's now advance from historical times to the recent past. After a delicious lunch at the Posada del Inca, my son and I spent the afternoon reading and lounging in the warm sun, listening to the sounds of firecrackers exploding in celebration of Carnival week, and waiting for dinner, which we wolfed down in complete enjoyment. The next morning we hiked all over Sun Island, trailing our relentlessly fast guide Dante. While walking, we enjoyed the magnificent views and dodged dozens of sheep and the occasional llama. (As I subsequently reported to US Customs, I did not stumble into a single incidence of animal droppings. That is my story, and I am sticking to it. The customs officials let me keep my shoes).

Lunchtime arrived. We stopped at stone fountain built by the Incas with three spouts, where we drank from the clear spring water, then walked down the long Inca stairway, and made our way to the Uma Kollo restaurant overlooking the lake. At this restaurant, also owned by Crillon Tours, we dined on delicious lake trout retrieved right before cooking from one of the many trout farms in Lake Titicaca… an exquisite meal.

The *TITICACA ARROW*, captained by Ricardo Mata, waited below to carry us and a German tour group back to Copacabana. We stopped off on the way at Moon Island (Isla de la Luna). From this island, the creator-god of Inca mythology Viracocha, commanded the rising moon. Here we toured the ruins of the Temple of the Virgins, a sort of Incan nunnery.

Copacabana, Bolivia
Walking down to the harbor

(Continued on page 5)

Copacabana, Bolivia on Lake Titicaca

The Hydrofoil Fleet

Below is a list of the hydrofoils that Crillon Tours owns and operates on Lake Titicaca:

Original 4 Albatross models:

- ◊ *Andes Arrow*
- ◊ *Copacabana Arrow*
- ◊ *Inca Arrow*
- ◊ *Titicaca Arrow* (later stretched)

Subsequent Acquisitions:

- ◊ *Sun Arrow* – Seaflight type from Italy
- ◊ *Bolivia Arrow* – larger capacity vessel designed and built by Helmut Kock
- ◊ *Glasnost Arrow* – Russian Volga

Hydrofoil Shangri-La

(Continued from page 4)

From Moon Island we hydrofoiled on to Copacabana. At the border we parted from our indefatigable guide Dante and motored back to Puno.

Crillon Tours operates seven hydrofoils with a capable crew of mechanics, pilots, and sailors. Their website is www.titicaca.com. Although Darius Morgan, Sr. is still President, his son Ing. Darius Morgan, Jr. and daughter-in-law Elsa A. de Morgan serve as the executive management. All boats are maintained in excellent mechanical condition and deliver fine performance. Tourists arrive from all over the world to visit Lake Titicaca and travel on these ferries. Will you join them?

[Editors Note:The on-line edition of the IHS Newsletter adds this complete article in Spanish and additional photographs of the Lake Titicaca environs]

(More photos on next page)

Titicaca Arrow
Copacabana Harbor

Hydrofoil Shangri-La

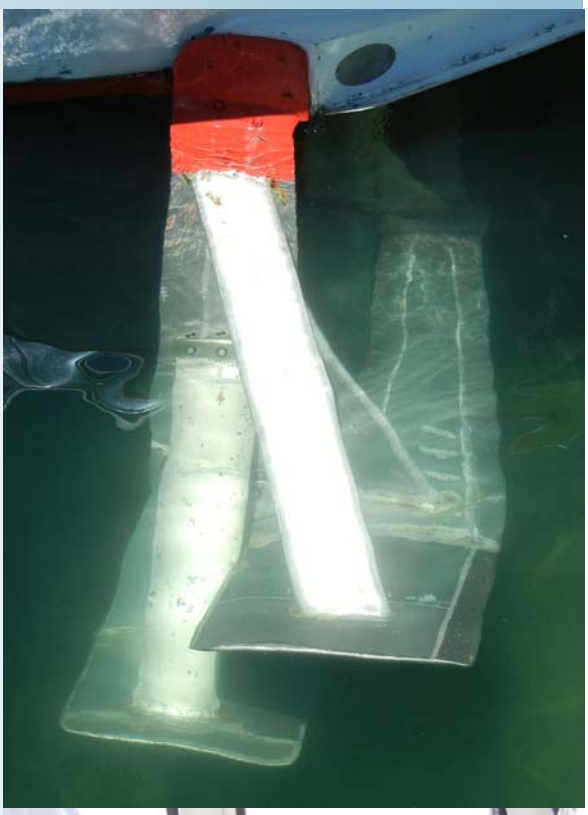
(Continued from previous page)

Copacabana Arrow (6 photos)

(More photos on next page)

Hydrofoil Shangri-La

(Continued from previous page)



Captain Ricardo Mata

Titicaca Arrow (5 photos)

Remember Amphibious Hydrofoils? Yes, I Do!

By V. H. Van Bibber, IHS Member

In the IHS Newsletters for the 1st and 2nd quarters of 2011 there were articles "Do You Remember Amphibious Hydrofoils?" I am responding from personal experience.

John Bader and I were instrumental in getting Food Machinery Corporation (FMC) to make a presentation to US Navy Bureau of Ships proposing an amphibious hydrofoil. FMC then received a contract to design one, which became the LVHX-2. John and I designed the hydrofoil system, and I made the model and had the hydrofoils made for tow tank tests at David Taylor Model Basin (DTMB) at Carderock, MD. The photographs are of the model and the hydrofoil system used in the tow tank test.

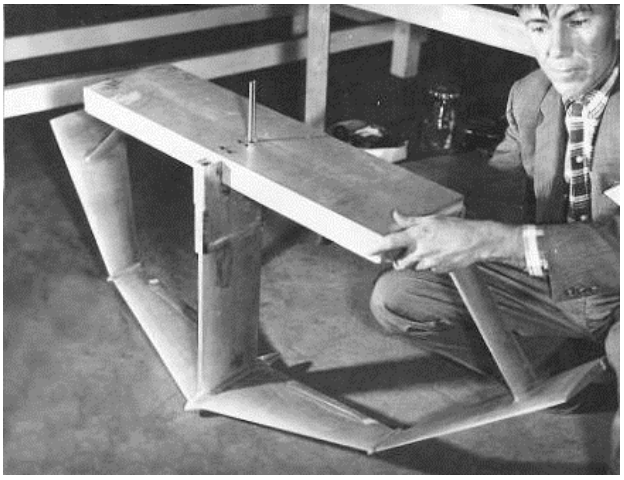
Another item of interest is the LCVP *Halobates* built by Miami Shipbuilding Corp. (MSC). BUSHIPS wanted MSC to demonstrate the operation of the craft in a moderate seaway to General James of the US Marines. I was selected to go to the demonstration with the General. During the seaway tests the pilot made a 180-degree turn on a wave; the craft rolled out of the turn, and water came over the bow. The General said that's enough let's go back to port.

We returned to Washington DC, and the General prepared a letter to BUSHIPS ordering all funds rescinded in the development of hydrofoil landing craft. I asked Robert Fyfe (Head of Code 421) and Owen Oakley to request withholding the letter until another demonstration could be arranged. General James agreed to return to Miami for an additional test series. I then asked to be assigned as the Bureau of Ships hydrofoil test pilot. CDR W. M. Nicholson and LCDR Randal King prepared a letter stating my authorization to be a hydrofoil test pilot.

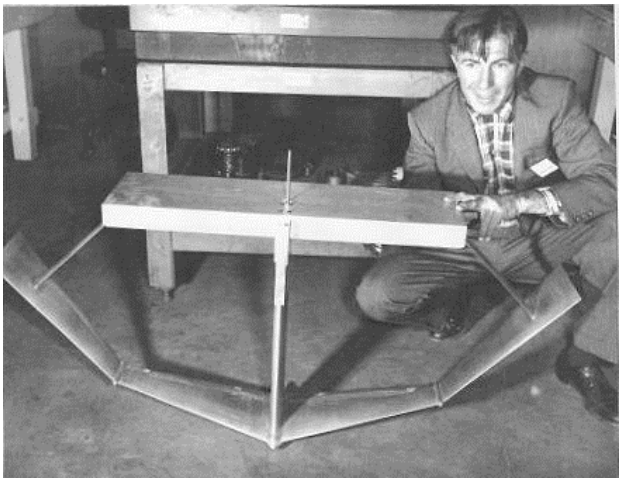
We returned to MSC. Sea conditions were more severe than the previous tests. The *Halobates* pilot and I were onboard when we arrived at the area of tests. I took the controls and flew maneuvers including 180-degree and 360-degree turns without any foilborne problems. The General called for us to come to the escort vessel to pick him up. We again flew into the seaways without any disagreeable operational tests. The General stayed aboard *Halobates* for the ride back to port.

The problem with the first demonstration was that the MSC pilot would reduce the craft speed in the turns. This caused a rapid loss of lift on the outboard side of the turn – where we wanted an increase of hydrofoil lift. As a result, the craft would plunge on the outboard side, causing water to come over the bow.

General James returned to his office at the Bureau of Ships; he immediately withdrew his letter to rescind the funds and allowed us to continue with the operational test program.

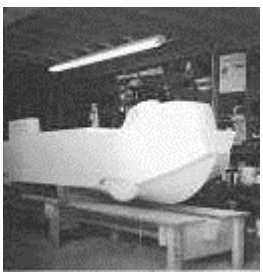


Foil Model for LVH Tow Tank Tests
Built by V.H. Van Bibber



Hydrofoil on Carriage
Later Mounted on Hull Model for Final Test

LVHX2 in Action
From: cover of FMC Progress Magazine*, Vol. 14, No. 1*



Hull Model for LVH Tow Tank Tests
Built by V.H. Van Bibber

Jetfoil Evolution

(Continued from page 3)

ed to Elliot Bay and the BMS facility at Pier 91 in Seattle. Except for the ACS (Automatic Control System), all basic systems were in the production configuration. Water barrels were used for ballast to simulate weight and balance for various fuel and passenger loadings. Initial calm water testing of a new hydrofoil design is intended to determine vehicle behavior relative to the design criteria. On a new boat such as Jetfoil, testing is equivalent to that performed on a new aircraft. The scope of calm water testing was to verify both hullborne and foilborne performance envelopes and at times was rather boring. Several months of calm water testing included 144 trials for propulsion, hydrodynamic drag and foil incidence angles changes for optimum performance. Test were also conducted on the pre-production ACS and on production ACS after it was installed. By December 1974 we were ready to move on to rough water testing. During the transit to rough water in the Strait of Juan de Fuca we encountered large swells and the turbines shut down several times before we returned to Pier 91. No surprise, but it was worse than I expected, and it was a serious delay to the test program while everyone regrouped to solve the problem. Two fixes were installed, a TUPS (Turbine Unloading Protection System) and a "contouring" mode which increased the response to wave encounters and vertical accelerations that degraded ride quality. The fixes helped foil broaching and inlet unwetting enough to define the rough water capabilities. Jetfoil was basically a 40 knot sea state 4 boat and not the advertised 45 knots in 12 foot waves. Jetfoil testing on boat 001 ended in February 1975 and returned to Renton for refurbishment and interior installation. Meanwhile boat 002 which was the first of two short strutted boats for FEH was undergoing builders acceptance and Coast Guard certification trials. Boat 002 the "Maderia" was accepted by FEH in February 1975 and commenced service between Hong Kong and Macao in April of 1975. In March 1975 boat 003 began testing, certification and builders trials for PST.

The "Kamehameha" commenced interisland service in Hawaii in June 1975. Boat 005, the "Santa Maria", the second and last short strutted boat was delivered to FEH in June. Before delivery we ran a short demonstration run for Georgian Gulf Cruises from Victoria to Vancouver Canada. Jetfoil 001 the "Kalakaua" the refurbished test boat was delivered in August and 004 the "Kuhio" in September 1975. BMS test personal in Renton and Seattle were working 10-12 hours a day and often 7 days a week. The BMS SST (Ship System Test) organization that was created in 1974 and was comprised of two test teams with Dick Dougan on PHM and me on Jetfoil both reporting to Vern Salisbury. When I wasn't launching, transiting or testing boats I was training customer crews in Hong Kong and Hawaii.

My next Jetfoil adventure which I will never forget was the delivery of boat 006 to Venezuela.

The PHM Name Change

By Karl Duff, IHS Member

Early in 1974, I was serving as the PHM Deputy Program Manager under the late CAPT Jim Wilkins. We were making rapid progress with Boeing to build the lead ship. However, the release of SECNAV Notice 5030 (15 Feb 1974) caused deep consternation in the program by naming the lead ship *Delphinius* (Greek for "Dolphin"). Upon realizing the effeminate sound of the adulterated name *Delphinius* and especially the further adulterated name of *Dull Penis*, we immediately set about to obtain a name change. Everyone told me it was impossible, but we decided to try anyway.

I tried every avenue I could find, all the offices involved in the original name selection – The Office of Naval History and our program sponsor in the Office of the Chief of Naval Operations. Despite many contacts, phone calls, and vigorous arguments, the official SECNAV Notice had been promulgated. No one wanted to go back to the Secretary of the Navy to persuade him he'd made a mistake.

I finally decided there was only one man in the Navy who could and would make the effort, if we could get word to him. That was Admiral "Ike" Kidd, a colorful and vigorous four-star who commanded the Naval Material Command and had a strong fleet background. His frequent expressions of fleet problems indicated he would certainly understand and agree with the need for a name change – and would not shrink from saying so to the Secretary.

So I wrote a memo to the Commander of the Naval Sea Systems Command, Vice Admiral Robert Gooding, asking him to take the matter to ADM Kidd. I included in the memo all the background and the thought that if we could not obtain a name change, the crew would have to be "fighting men indeed." After two further weeks had passed with no response, I went upstairs to inquire of VADM Gooding's Executive Assistant, CAPT (later RADM) Ed Peebles. He was very harsh on me, saying, "You might as well forget it. I tried to change the name of a submarine once and got absolutely nowhere! As far as I know, no one has ever succeeded in changing the name of a ship, especially the lead ship of a new class after the Secretary of Navy has officially announced it!"

(Continued on page 10)

About the Presenter

Mike Webster has been Austal USA's Chief Naval Architect for the past eight years. His responsibilities have included developing the detail designs and production information for the LCS trimaran and Joint High Speed Vehicle (JHSV) catamaran.

For four years prior to that Mike worked at Kvaerner Philadelphia, developing build strategies for the Matson 2600 and 2500 teu* container ships and early planning for their 46,000 dwt product tankers.

Mike was previously the Disney Cruise Line's lead steel inspector at Fincantieri in Italy during construction of Disney Magic and Disney Wonder.

Before that, Mike spent five years at Ingalls Shipbuilding as lead naval architect for launchings, sea trials and drydockings of CG 47, DDG 51, and LHD 1 ship classes.

Mike studied naval architecture and marine engineering at Webb Institute of Naval Architecture and the University of Michigan.

* *one teu is equivalent to a standard 20-foot container*

Joint IHS / SNAME SD-5 Dinner Meeting

(Continued from page 1)

1030 sq m (10,760 sq ft). Top speed exceeds 40 knots, and its range unrefueled is 3500 nm. It has 4 active ride-control fins on the main hull, two forward and two aft.

Mike Webster described the LCS 2 as a thin monohull stabilized by outriggers, implying that they normally carried a very small load. A thin monohull ship is known to be a low-drag hullform, and Mike also noted placing the outlying hulls longitudinally so that they achieved a favorable wave reflection resonance at design speed.

LCS 2 has 4 movable waterjets for maneuvering. It has known missions such as mine-hunting; but many mission suites are specified only by various weight, space, electrical hook-up, etc. interface requirements. Mike said that the aluminum, having a high strength-to-weight, is 5083 H116 (ASTM B928), with 6084 T5/T6 tailored (not next size up) extruded decks. He also described solutions to aluminum specific problems, such as fire protection, fatigue cracking, and welding. The LCS 2 is not painted above the water line; but it is below.

Mike described the production line process as a main line from top (in) to bottom (out) with auxiliary major parts moving from production stations on the left. The diesels, used up to 18 to 19 knots, exhaust out of the outriggers. The design rules used are a combination of ABS, IMO and USN rules. From the overall appearance of the LCS it appears to have achieved a low radar cross section. The LCS 2 has passed successfully underwater explosive tests. It is also required that it survive in sea state 8, and have a 30-year service life.

The PHM Name Change

(Continued from page 9)

He said it was a dead issue, and he would not take it up again with ADM Gooding.

While we were talking, VADM Gooding passed us on his way out of the office. I soon left also, now convinced there was no hope. There at the elevator was VADM Gooding. He was on his way to the basement to catch his car to ADM Kidd's office! I quickly filled him in on the memo and asked if he had realized that one of the adulterations of the name *Delphinius* was *Dull Penis*. He had not, but promised to take it up immediately with ADM Kidd.

Two days later I was called by ADM Kidd's Executive Assistant. "Is this the young buck Commander who has asked for a name change to the *USS Delphinius*?"

"Yes," I replied, wondering what was next.

"ADM Kidd said to tell you that Secretary Middendorf has agreed to a name change. He wants to know if the proposed alternative name, *USS Pegasus* is okay with you."

I thought *Pegasus* was a great name, especially for the type of vessel it was to represent – flying hydrofoil ships. In less than two weeks, a new SECNAV Notice 5030 had been promulgated, making the name change official.

I never understood how all of the vain effort of weeks could be so futile then suddenly all fall into place. I still have difficulty thinking it was all merely a coincidence.

IHS Membership Dues for 2012

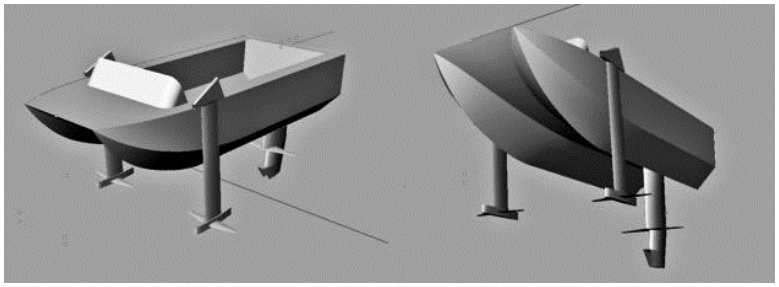
As 2011 draws to a close, it is time to pay your dues for 2012… unless of course you have already paid! Individual membership options are: US$30 for one year; $56 for two years; or $82 for three years. Student membership is still only $10 per year. Sustaining memberships are available to corporations, non-profits, and other organizations and groups for $250 per year.

You can pay online by credit card via PayPal. Go to *www.foils.org/membership.htm* and follow the instructions. This works from inside or outside the USA. Alternatively, you can mail a check drawn in US dollars on a USA bank to IHS; PO Box 51; Cabin John MD 20818; USA.

The IHS Board of Directors, Officers, and Staff are volunteers, and they pay dues like all IHS members. IHS dues do not go for salaries. They pay the service providers for two IHS websites (foils.org and hydrofoilworld.org), the BBS, newsletter publication, and miscellaneous expenses. Dinner meetings in the Washington DC area funded by admission fees, not by IHS dues.

Little Squirt… Very Little Squirt

For his next project, master modeler Yoichi Takahashi is undertaking to design and build a radio controlled *Little Squirt* model. He is now working on a water jet power pump and needs information… he believes Little Squirt has a general purpose centrifugal type pump, but he could use details. You can contact him via the IHS BBS bulletin board, accessible from www.foils.org.



From the Boardroom

Election of IHS Officers for the year 2012 was certified at the meeting of the IHS Board of Directors on 23 June 2011. Congratulations to the following outstanding contributors to IHS (their names may sound familiar):

- John Meyer, President
- Mark Bebar, Vice President
- Joel Billingsley, Secretary
- Frank Horn Treasurer

Frank Horn presented a proposal from Dave Patch to initiate a PHM reunion. The Board saw merit in pursuing this, noting that it is a major effort to organize. A suggestion was made to make this a Navy Hydrofoil Program reunion to increase the participation.

IHS Webmaster Bill White presented statistics for the site showing that visits have decreased significantly over last year. Causes are not clear, but the drop may indicate a need to refresh the site. Accordingly, foils.org has been reorganized, including use of buttons at the top of the screen for ready access to content. An improved Search feature has been added.

Find Old Friends; Make New Ones

Nestor Rojas, former Jetfoil Captain in Puerto La Cuz, Venezuela in 1977, contacted IHS for help in locating Lawton Evans, the Jetfoil engineer who trained him in Hawaii with Boeing Marine Systems. Bruce Bryant, who is writing a series of articles for the IHS newsletter about his Jetfoil experiences gave the disappointing news that Lawton Evans had passed away several years ago. The moral of the story: Don't wait to contact and catch up with your co-hydrofoilers from the past, and don't let your current contacts fade away. IHS will help look for long-lost hydrofoil friends. The IHS bulletin board (BBS) is a good medium to catch up and to share with those whom you know and other interested hydrofoilers whom you don't know… yet!

[22 Oct 1976 Honolulu Hawaii] Nestor Rojas completes his training aboard the Kalakaua.
L to R: Lawton Evans, Pascual Rivas, Oscar Contreras, Bruce Bryan, Arturo Corzo, Charles Herzer, Nestor Rojas

Evolution of the Hoop

Professor Oscar Tietjens' patented the surface-piercing hoop foil was first tested in 1932 on a small speed boat at Philadelphia. That 500 lb. craft reached about 25 mph with only a 5 hp motor. Tietjens later returned to Germany where he continued his hydrofoil development work. The VS-7 hydrofoil, a 17-ton craft with a hoop foil system, was built in Schleswig, Germany, at the Vertens Shipyard. The VS-7 was built to the same displacement and had the same power as Baon Hanns von Schertel's VS-6. The two boats were competed under the auspices of the German Armed Forces. Although the VS-7 attained a speed of about 50 knots compared to the 47 knots of von Schertel's VS-6, the stability and maneuverability of Tietjen's hydrofoil was much poorer than that of the VS-6, and the VS-7 had difficulty with take-off.

VS-7 *designed by O. Tietjens*

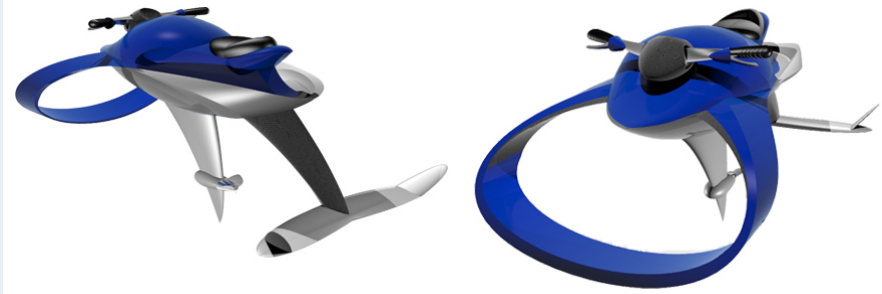
The hoop foil concept continues to stimulate the imaginations of industrial designers, and the concept is being down-sized from the VS-7. The *Hydrofoil Romania Extreme* is one concept that can be found with a bit of internet searching. Models of this vessel are for sale on ebay.com.

Hydrofoil Romania Extreme

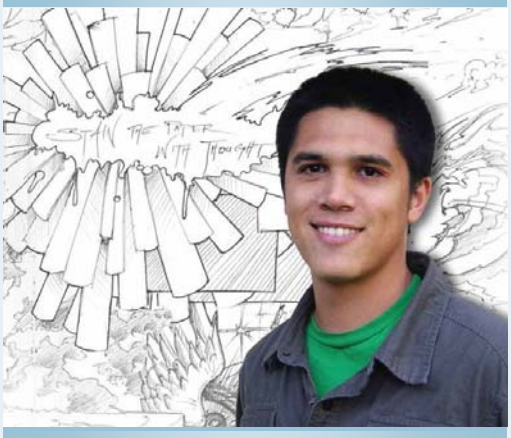
The *Dolphin Hydrofoil Personal Watercraft* – brainchild of Nikko van Stolk (www.nvanstolkdesign.com) – is a new concept featured in several technical blogs, including Gizmodo, Trendhunter, Born Rich, and Neo Teo. Front and rear hydrofoils act as underwater wings, lifting the main hull of the craft above the water, increasing efficiency and the maximum achievable speed beyond the capabilities of a traditional jet ski. The elliptical front hydrofoil provides continuous lift, while enabling the rider to execute high speed banked turns. At speed, the craft seemingly flies above the water rather than skipping across its surface. The impeller, embedded in the central dagger board of the craft, provides continuous thrust while the lift generated by the foils absorbs the majority of speed-robbing turbulence from surface waves. As the craft decelerates, the hydrofoils sink and the craft comes to rest on its hull.

Nikko can be contacted at nvanstolk@gmail.com. Comments on the practicality of the Dolphin concept, advantages and disadvantages of the hoop system applied to a personal watercraft, or ideas/ recommendations for mechanical details, propulsion, materials, marketing, and any related subjects are welcome and solicited. Please copy your comments to editor@foils.org for possible publication in a future Newsletter.

Dolphin Hydrofoil Personal Watercraft



Nikko van Stolk, Industrial Designer



(Continued from page 7)

Hidroalas Shangri-La

De Barney C. Black, Miembro Vitalicio de la Sociedad Internacional de Hidroalas

La edad de oro de los hidroalas terminó hace casi medio siglo; muchos de los pioneros que crearon hidroalas en esa época ya murieron; y los diseños multicasco – no hidroalas – caracterizan a los transbordadores rápidos que se construyen hoy en día. Sin embargo, hay un lugar – en lo alto de la Cordillera de los Andes, en la remota frontera entre Bolivia y Perú – donde el tiempo se ha detenido, y los barcos hidroalas perduran y prosperan. Operan en el frío vigorizante y aire enrarecido a 12.507 pies (3.811 m) sobre el nivel del mar en el Lago Titicaca, el lago comercialmente navegable más alto del mundo. Con una longitud de 118 millas (190 km) y un ancho máximo de 50 millas (80km), el Titicaca es también el lago más grande sin salida al mar en América del Sur.

Mi hijo y yo pasamos recientemente cuatro días explorando esta zona, paseándonos por el lago en un hidroalas. Normalmente los turistas del lago Titicaca que desean viajar en hidroalas, llegan y salen de La Paz en Bolivia; pero nosotros volamos desde Lima (Perú) a Juliaca, después tomamos un ómnibus a nuestro hotel en Puno. Allí pasamos un día aclimatándonos a la altura... y comprando suéteres (¿mencioné que el aire es punzante y frío?). Este viaje a principios de marzo fue durante la temporada de lluvias. Sin embargo tuvimos la suerte de tener sol durante el día todo el viaje, con lluvia por la noche, y con mucho espacio pues no había una gran masa de turistas.

Al día siguiente nos llevaron en camioneta a la frontera, cruzamos caminando hacia Bolivia, y nos reunimos con nuestra guía Dante, de Crillon Tours. Después de una mañana placentera paseando por la pintoresca ciudad de Copacabana, caminamos hasta los muelles y abordamos el *Copacabana Arrow*. Después de un paseo agradable, desembarcamos en la Isla del Sol (lugar sagrado del nacimiento del dios incaico el Sol) y caminamos a nuestro hotel, la Posada del Inca, una hacienda antigua llena de recovecos restaurada por Crillon Tours. Los porteros cargaron nuestro equipaje y laptops, pero aún así sentí que me quedaba sin aliento al subir esa colina a esa altura, debido a la celeridad de nuestro infatigable guía Dante. Así que me embarqué en el bus del hotel (una mula, no hay coches en la isla) y monté el resto del camino con comodidad. La Posada del Inca es un encantador y floreado hotel... no hay teléfonos ni televisores en las habitaciones, pero sí hay una incomparable vista del lago, bastante agua caliente para las duchas, y – anoten esto – mantas eléctricas en las camas. ¡Genial!

Hidroalas en Huatajata

Darío Morgan, el dinámico propietario y aún Presidente de Crillon Tours en La Paz, Bolivia, ha armado una flota con 7 botes hidroalas y la ha mantenido operativa durante muchos años. Comenzó en 1966 con la compra de uno de los catorce transbordadores *ALBATROSS* tipo hidroalas de 20 pasajeros diseñado y construido por Helmut Kock, para servir como taxis acuáticos para la Feria Mundial de Nueva York del año1964. Ese barco fue llevado en un carguero hasta Matarani, Perú; después continuó por ferrocarril a su nueva e insólita casa en el lago. El Sr. Kock capacitó a un equipo local en la operación y mantenimiento de hidroalas. La tripulación construyó muelles e instalaciones en las ciudades bolivianas de Huatajata y Copacabana, y en la Isla del Sol.

El Sr. Morgan compró un segundo *Albatros* al año siguiente y, después, dos más. Sin embargo, el éxito de Crillon Tours de elevar el nivel del turismo en el lago exigía una mayor capacidad. El Sr. Kock entonces se comprometió a diseñar y construir uno más grande: un hidroalas de 50 pies que pudiera llevar a 40 pasajeros. Realizó los planos de diseño y detalle en los EE.UU., generando una lista de materiales de más de 1,400 artículos en el proceso. En Pennsylvania, reunió todo el material necesario, equipos, motores y herramientas para construir el barco, y luego envió el lote a Bolivia. La construcción comenzó en diciembre de 1975. El barco fue lanzado al agua en septiembre de 1976 con el nombre de *Bolivia Arrow*, tras lo cual fue puesto a prueba y equipado totalmente, empezando a trabajar en febrero de 1977.

(Continued on page 16)

Hidroalas Shangri-La

Inca Arrow

Inca Arrow 1968


Bolivia Arrow


Lago Titicaca

Sun Arrow


Hotel Posada del Inca

Hidroalas Shangri-La


Isla de la Luna


Lago Titicaca


Lago Titicaca


Hotel Posada del Inca


Isla del Sol—Residente

Hidroalas Shangri-La

(Continued from page 13)

Un segundo barco de este diseño fue planeado, pero Helmut Kock estaba teniendo problemas con su vista. Fue sometido a tres operaciones de la retina en Bolivia, seguido de tres operaciones más en los EE.UU. Esta terrible experiencia mantuvo al Sr. Kock alejado del trabajo durante tres años. La necesidad de Crillon de un hidroalas con mayor capacidad de pasajeros persistía. El Sr. Morgan viajó a Italia y compró un *Seaflight* de 60 pasajeros, que llamó *Sun Arrow*. Posteriormente, adquirió un hidroalas ruso *Volga* de 28 pies (8,5 metros) con capacidad para 6 pasajeros, que ahora se llama *Glasnost Arrow*. En 1983-84, Helmut Kock regresó a Bolivia para expandir uno de los primeros cuatro barcos, el *Titicaca Arrow* en 6-1/2 pies (2 metros) para aumentar la capacidad de pasajeros a 30 personas.

Copacabana—La Playa

Ahora volvamos de los tiempos remotos hasta el pasado reciente. Después de un delicioso almuerzo en la Posada del Inca, mi hijo y yo pasamos una tarde de abandono leyendo y descansando bajo el sol caliente, escuchando los sonidos de la explosión de petardos en la celebración de la semana del Carnaval, y esperando la cena, la cual devoramos con mucha satisfacción. A la mañana siguiente caminamos por toda la Isla del Sol, detrás de nuestro acelerado guía Dante. Mientras caminábamos, disfrutamos de los magníficos paisajes y esquivamos docenas de ovejas y de vez en cuando algunas llamas. (Como informé posteriormente a la Aduanas de EE.UU., no tropecé en ninguna ocasión con boñigas. Esa es mi historia, y me aferro a ella. Los funcionarios de aduanas me dejaron quedarme con mis zapatos).

Llegó la hora del almuerzo. Nos detuvimos en una fuente de piedra con tres caños construida por los Incas, de la cual bebimos agua clara de manantial, bajando luego por la larga escalera del Inca, en camino hacia el restaurante Uma Kollo, con vista al lago. En este restaurante, también propiedad de Crillon Tours, cenamos una deliciosa trucha de lago capturada – justo antes de ser cocinada – de uno de los criaderos de truchas en el lago Titicaca... una comida exquisita.

El *Titicaca Arrow*, capitaneado por Ricardo Mata, esperó abajo para llevar a un grupo de turistas alemanes y a nosotros de regreso a Copacabana. En el camino nos detuvimos en la Isla de la Luna. Desde esta isla, el dios creador de la mitología inca Viracocha, dirigía a la luna creciente. Aquí visitamos las ruinas del Templo de las Vírgenes, una especie de convento inca. Desde la Isla de la Luna continuamos a Copacabana. En la frontera nos despedimos de nuestro infatigable guía Dante y partimos de regreso a Puno.

Hasta el día de hoy, Crillon Tours opera siete hidroalas con un equipo muy capaz de mecánicos, pilotos y marineros. Su sitio web es www.titicaca.com. Aunque Darío Morgan (padre) sigue siendo el presidente, su hijo el Ing. Darío Morgan (hijo) y su nuera Elsa A. de Morgan trabajan como gerentes ejecutivos. Todos los barcos se mantienen en excelentes condiciones mecánicas y ofrecen un muy buen rendimiento. Los turistas llegan de todas partes del mundo para visitar el Lago Titicaca y viajar en estos transbordadores. ¿Quieres unirte a ellos?


Lago Titicaca