The NEWSLETTER

International Hydrofoil Society

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TURBOJET REFURBISHES JETFOIL FOR LUXURY CHARTER MARKET

Excerpts from Fast Ferry International, November 2008

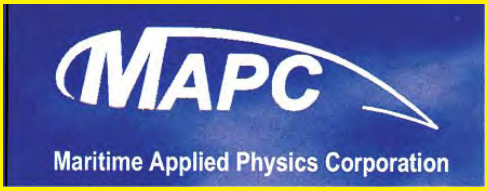
In October last year, Turbojet unveiled a new logo and livery for its vessels "in celebration of its 45th anniversary". Repainting of vessels is now virtually complete. According to the company, "Turbojet is investing over HK$10 million dollars to convert its fleet into a "race-car red" and publicizing the new look in a range of electronic and printed media.

BMS Jetfoil 929-115 Hydrofoil *Funchal* on the Hong Kong-Macau Route

TurboJet has also refurbished one of its Boeing Marine Systems BMS) Jetfoil 929-115 hydrofoils, *Funchal,* "to meet the increasing demand for high end charter services".

See Turbojet, Page 4

SUSTAINING MEMBERS



YOUR 2009 IHS DUES ARE DUE

See Full Announcement on Page 2

INSIDE THIS ISSUE

PRESIDENT'S COLUMN

To All IHS Members

I want to point out the flurry of commercial hydrofoil activity in Europe depicted in several articles in the Fourth Quarter 2008 issue of the IHS Newsletter. As I prepared these articles, I was struck by the fact that operators in such countries as Poland, Hungary, Greece and of course Russia, continue to expand their hydrofoil operations. Also, the current issue (see pages 4-6) describes rather large numbers of commercial hydrofoils carrying many millions of passengers in the Far East.

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 22 January. The presentation was "Connectorless SEATRAIN for High Speed, High Payload, and Austere Port Access" by Gabor Karafiath, NSWCCD, Resistance & Propulsion Division. He reported that several "seatrain" concepts have been proposed in recent years. The design philosophy and reasons for examining the twin tail connectorless seatrain concept developed at NSWCCD was explained. A copy of the presentation is available on the IHS website.

For the year of 2008, the final tally for new members on the Society's roles was 19. I am pleased to report that the year 2009 has started off with a flurry of new members; namely 7 in the first 2 months of the year. But all members are still 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 2009 DUES ARE DUE
IHS Membership options are: US$20 for 1 year, $38 for 2 years, and $54 for 3 years. Student membership is still only US$10. For payment of regular membership dues by credit card using PAYPAL, please go to the IHS Membership page at <http://www.Foils.org/member.htm> and follow the instructions.

During this past Quarter, High Caliber Solutions (HCS) has restarted work on putting together the Newsite, mentioned in previous Newsletters. However progress has been slow and HCS is working through some of the glitches. I will keep you informed.

As your President and Newsletter Editor, I continue my plea for volunteers to provide articles that may be of interest to our members and readers. Please send material to me (jr8meyer@comcast.net), Bill Hockberger (w.hockberger @verizon.net) and Ken Spaulding (kbs4101@rcn.com). We will be pleased to hear from you.

John Meyer, President

WELCOME NEW MEMBERS

Douglas Hamlin – Doug has been in the Marine-Maritime Industry since 1970 and served in the US Army's Transportation Corps from 1970-1974. After the military service (1974-1976) Doug went into the Recreational Marine Industry as: Rotary Marine Engine Dealer, and then became a "Boat Builder". In 1976 to 1978 Doug formed a Company "Rotary Marine Engineering" which manufactured Rotary Marine Engines. In 1983-1985 he worked for Islander Yachts as a Production Mgr. (Assembly Dept.). From 1985 to 1986 Doug managed two Shipyards. In 1989 he started research on hydrofoils as a solution for local Emergency Response Vessels, speed dilemma. In 1999 Doug had a technology breakthrough that lead to a new vessel design the "Hybrid-Vessel". In 2008 Doug has formed "Innovative Marine Technologies Inc." (a small think-tank & R&D firm) to Develop the "Smart-Fast- Hybrid-Vessel". For more information contact Doug at: doug@Marine-One.biz

Sherwin Holmes - Sherwin resides in Palm City, Florida where he does most of his boating and experimenting with sails etc. He has a Masters Degree is in Audiology, has teacher certification and his occupation is managing a federal grant funded training organization for a county public school system in Florida. Sherwin's interests in hydrofoils is for pleasure boats with small sailboats as a primary area of interest (under 26 feet). Motoring sailboats under foils are also of interest.

WILLIAM ELLSWORTH - IN MEMORIAM

William Martin Ellsworth, 87, engineer and innovator in the field of modern naval ships and crafts, and known as "MR. HYDROFOIL" by his fellow hydrofoilers, died Wednesday, Nov. 26, 2008, in Adamstown, Maryland. Born on Nov. 5, 1921, he was the son of the late William Martin Ellsworth Sr., and Anna (Buck) Ellsworth. He was the loving husband of the late Annette (Degnan) Ellsworth, who passed away on March 8, 2007.

Bill Ellsworth was a long-time member of the International Hydrofoil Society and served for several years on the Board of Directors. He was presented with an IHS award honoring his many contributions and innovations in the field of hydrofoils.

Mr. Ellsworth was born in Chattanooga, Tenn. and moved with his family to Washington, D.C. in 1932. He was a resident of Bethesda for more than 50 years. Mr. Ellsworth served in the army for four years during World War II, where he fought on the European front, including the Battle of the Bulge and achieved the rank of second lieutenant. After the war, Mr. Ellsworth attended the State University of Iowa on the G.I. Bill and received a bachelor's and master's degree in engineering, majoring in fluid mechanics. While an instructor at Iowa, he met Annette Degnan who became his wife of 60 years. Upon graduation in 1948, Mr. Ellsworth joined the staff of the David Taylor Model Basin in Carderock, Maryland. He held various positions in the hydromechanics laboratory, advancing to technical manager of the Hydrofoil Development Program Office, and eventually associate technical director for systems development and head of the systems development department. Recognizing the need for a more formal organization to test, evaluate and develop military hydrofoils, Mr. Ellsworth conceived the Hydrofoil Special Trials Unit which was established at the Puget Sound Naval Shipyard in Bremerton, Washington. This establishment formed the basis for the technical and operational development of the U.S. Navy's hydrofoils. Mr. Ellsworth retired from the government in 1983 and subsequently worked as a consultant in naval engineering and vice president of Engineering and Science Associates, Inc. Mr. Ellsworth was a licensed professional engineer, an honorary life member of the American Society of Naval Engineers, a fellow of the American Society of Mechanical Engineers, and a charter member of the North American Section of the International Hydrofoil Society. He was also the author of numerous publications in the field of naval engineering, including the book Twenty Foilborne Years. Mr. Ellsworth was awarded the ASNE Gold Medal in 1973 and was the recipient of the Distinguished Civilian Service Award, Presidential Meritorious Rank, and the David Taylor Award for Scientific Achievement. Mr. Ellsworth is survived by his daughter, Joan McConville and husband Sean of Damascus, Maryland; and two sons, Michael William Ellsworth and wife Patricia of Germantown, Maryland and Peter Joseph Ellsworth and wife Kathleen of Washington, D.C.; and nine grandchildren.

At the Memorial Service held on December 1, 2008, Dennis Clark (IHS Member) gave the following Eulogy for Bill Ellsworth:

"I am Dennis Clark. I had the pleasure and privilege of working with and for Bill Ellsworth for over 40 years while at the David Taylor Model Basin now called the Carderock Division. Isaac Newton wrote in a letter to Robert Hooke in 1676, *" If I have seen farther, it is by standing on the shoulders of giants".*

"I believe it not an exaggeration to talking about the passing of a giant. Bill Ellsworth was a giant not only in stature, but most importantly in technological leadership. He has affected the lives and careers of thousands and has left the US Navy with a number of advanced vehicle options such as hydrofoils, air cushion vehicles, high-speed planning craft, Small Waterplane Area Twin Hull (SWATH) ships in addition to host of advanced concept ships, planes, and platforms.

"As a junior engineer, I heard a presentation Bill gave on hydrofoils in 1965. I was impressed with his dynamic personality, enthusiasm, and his vision for future options for the US Navy. I became the coordinator for the Structures De-

Continued on Next Page

William Martin Ellsworth
(Continued From Previous Page)

partment supporting the Advanced Hydrofoil Program Office that he headed. He had a unique skill of managing an organization in 3 different locations, with numerous contractors, universities and collaboration with foreign countries. Bill Ellsworth was bigger than life to this young engineer and I can vividly remember meeting him one on one to proposed an idea. I went over to his small and modest office after hours at 5:30. After I describe my idea, Bill sat there for a second and then formed his fist into a hammer and slammed it down on the table saying, " That's a great idea. I like it". The small room made his voice louder and I sat there paralyzed unable to speak. I never met someone so animated and enthusiastic. Walking back to my building I was convinced that I wanted to work directly for him. In 1967 I joined the Advanced Hydrofoil Program Office and the Manager of System Integration, a position that never existed at the Model Basin that was typical of Bill's management innovations. In April of that year the Director, Dr. Kiel formed the Systems Development Office which Bill built into the System Development Department which consisted of the:

- Advanced Hydrofoil Program Office which resulted in a 6 ship squadron

- Amphibious Assault Landing Craft Office resulted in 92 in service today

- SWATH Ship Development Office resulted in a new class of ships

- Coastal Patrol Interdiction Craft (CPIC-X) Office and the

- Advanced Concept Office.

"Bill retired from the Carderock Division in 1983 but continued to consult and write about advanced ship concepts, strategic planning and in 1998 edited a book describing the 100 year history of the David Taylor Model Basin.

"It is difficult to list the many awards and recognitions given to this technological pioneer but many of us have benefitted from standing on the shoulders of this giant in order to see further into the future needs and options for the US Navy. He loved the Basin and the US Navy and his leadership and dynamic personality will be sadly missed."

The International Hydrofoil Society has made a contribution, in accordance with the wishes of Bill Ellsworth, in loving memory of his late wife, Annette Ellsworth.

TURBOJET REFURBISHES JETFOIL
(Continued From Page 1)

When the first Jetfoils entered service in Hong Kong in the mid 1970s with Far East Hydrofoil, the forerunner of TurboJet, they were fitted out for 278 passengers.

Thirty years later, Norwegian designers were contracted to restyle the interiors of the vessels. Capacity was reduced to 240 passengers, with 32 'Super class' seats, a four seat VIP saloon and 104 'Economy class' seats on the main deck and another 100 seats on the upper deck.

Now the same Norwegian team has redesigned the interior of *Funchal* to seat 225 passengers. Thirty-two 'Super class' seats have been retained forward on the main deck, a second four seat VIP cabin has been added and the 'Economy class' section has been reduced to 89 seats. The upper saloon has been refitted with 16 'Super class' seats and 96 'Economy class' seats.

TurboJet's design brief for *Funchal* was to set a new standard on the Hong Kong-Macau route. Describing the project, Espen Thorup says, "With the vessel operated on short routes, the demand on the crew rises when higher standards of service for the passengers are applied. To achieve this, two new kiosks, one on each deck, were added and upgraded.

"Short trips mean quick turn around in port and therefore there was an emphasis on creating an interior design that is easy to maintain. The interior is designed to underline the passengers' feeling of 'flying' in luxurious surroundings. We have chosen to create a trendy interior with a light, young and warm Scandinavian design touch. This could only be done by replacing the total interior with a new design and deck layout. The exterior was also stripped down to the metal before applying new paint. This was done not only for esthetical reasons but in order to save weight.

TurboJet has also recently upgraded its shoreside facilities for passengers, opening a 'Service Centre' lounge at the Hong Kong Macau ferry terminal. Services available include priority passenger check in, luggage check in, snacks and drinks.

In 2006, the company introduced an online reservations system and this has since been extended to include WAP bookings. Passengers can collect tickets either from sales points or

Continued on Next Page

TURBOJET REFURBISHES JETFOIL
(Continued From Previous Page)

at 'Automatic Ticket Dispenser' machines in the terminals.

Stored value cards and Corporate Jetpass cards have also been introduced. Available at a minimum value of HK$500 and maximum of HK$1,500, the stored value card offers a 5% fare discount and bonus Points for future free crossings. The Corporate Jetpass is aimed at companies whose employees are frequent travelers.

TRAFFIC AND COMPETITION INCREASE ON HONG KONG-MACAU ROUTE

Excerpts from Fast Ferry International, November 2008

In 2007 16,861,000 passengers traveled between Hong Kong and Macau on fast ferries, 7.5% more than in 2006. Another 441,000 passengers traveled between Hong Kong airport and Macau, 34.9% more than in the previous year.

Figures released by the Hong Kong Marine Department confirm that traffic is continuing to increase. In the first six months of 2008, Macau services operated out of the Hong Kong Macau terminal in Central and the Hong Kong China terminal in Tsim Sha Tsui (Kowloon) carried 8,667,000 passengers, a rise of 9.85% compared with 7,890,000 passengers in the corresponding period of 2007. Growth on the Airport-Macau route was 52.94%, from187,000 passengers to 286,000 passengers.

This year is the first in which a third operator has made a significant contribution to the Hong Kong-Macau routes, not least in the number of services operated. The Marine Department does not issue separate figures for the Hong Kong and Airport terminals but the number of services operated to and from the three terminals during January-June 2008 totaled 47,090, or 12.95% more than the 41,690 operated in the same period of 2007.

For eight years, there were two operators on the Hong Kong-Macau route, TurboJet and New World First Ferry. In November 2007, they were joined by a third company, Cotai Jet. A fourth, Macao Dragon, will introduce services in the near future.

Future growth

The Hong Kong government estimates that annual traffic will continue to grow by around 8.3% per annum, increasing by approximately 1.66 million passengers per year to reach a total of 25.15 million in 2012.

FoilCat *Penha*

CSSC PS Hydrofoil *Balsa*

Although TurboJet operates 13 BMS Jetfoil hydrofoils and ten FBM TriCat 45m catamarans, the fleet also includes WaveMaster 39m catamaran Nansha No 11 and WaveMaster 42m catamaran Nansha No 18, both currently leased from Nansha Passenger Shipping, Kvaerner Fjell- strand FoilCat 35m hydrofoil catamaran Penha and CSSC PS 30 hydrofoil Balsa.

Fare level represents a clear paradox: higher operating costs due to labour and fuel costs may boost fares and hence impact on same day visitors who are likely to be price sensitive to ferry fare. However, increased competition with the entry of new operators who are related to the entertainment business in Macau may bring fares down to attract more visitors and customers.

On the other hand, more job opportunities can be found in Hong Kong with the construction of many large-scale infrastructure projects to start in the next few years. Our assessment is that the number of trips to Macau by Hong Kong residents will continue to increase in the next few years, albeit possibly at a somewhat reduced pace.

Turning to journeys made by nonresidents, the Marine Department says, "Mainland visitors constitute the main portion of ferry passengers to and from Macau. We are aware that Macau is positioning itself as a conference, exhibition and entertainment center and as such has ambitions to attract more international visitors. We will keep this development in view in our monitoring of future patterns of patronage.

TurboJet

The Hong Kong-Macau route continues to be dominated by TurboJet, the brand name of Shun Tak-China Travel Ship Management. The num-

Continued on Next Page

HONG KONG-MACAU ROUTE
(Continued From Previous Page)

bers are impressive, the company operates a fleet of 34 fast ferries on five routes, has a total asset value of over HK$2 billion and employs 1,900 people, including 400 engineers and maintenance staff.

Last year, the company carried over 14 million passengers, including 12.8 million between Hong Kong and Macau. In the first six months of 2008, it carried over 6.9 million passengers, including "a record high of 6.2 million passengers on the Hong Kong-Macau route".

TurboJet Continues to Operate Seven of the Ten BMS Jetfoil 929-100 Hydrofoils Built

However, in an opening address to the Interferry conference held in Hong Kong in October, Pansy Ho, the chief executive officer of TurboJet and managing director of Shun Tak Holdings, said, "The recent soaring fuel cost and shrinking traveler market, as well as oversupply due to a surge of new competition and new infrastructure, I believe, are the results of the economic cycle which reached its peak in the past two years.

"The market challenges that start to emerge will inevitably impose pressure on the operating environment. We have to be vigilant in managing this short term pressure on the profitability of our operation.

The Turbojet fleet of hydrofoils consists of 7 Boeing Marine Systems Jetfoil 929-100 hydrofoils (*Flares, Madeira, Pico, Santa Maria, Sao Jorge, Urzela, Guia*) and 6 Boeing Marine Systems Jetfoil 929-115 hydrofoils (*Terceira, Funchal, Lilau, Horta, Cacihas, Taipa)* and 1 x China State Shipbuilding Corporation PS 30 hydrofoil (*Balsa*).

TurboJet's 14 hydrofoils, two hydrofoil catamarans and ten FBM TriCat 45m catamarans are operated exclusively on the Hong Kong- Macau route. The company's four Kvaerner Fjellstrand Flying Cat 40m catamarans are generally operated on its Hong Kong Airport routes.

There have been some changes in the fleet in recent years. In 2006, TurboJet purchased two FBM TriCat 45m catamarans from the Pequot Tribal Nation in the United States and sold a BMS Jetfoil 929-100 hydrofoil to Marajet. This South Korean operator had previously purchased two Jetfoil 929-100s and a CSSC PS 30 hydrofoil from TurboJet in 2002-2004.

JAPANESE JETFOILS

Excerpts from December 2008 Fast Ferry International

At the 3rd Interferry Conference held in Hong Kong in October of 2008, one of the presentations was on the subject of Jetfoils in Japan.

The Jetfoil may be synonymous with Hong Kong but there are more operating in Japanese waters than there are on the Hong Kong-Macau route. Between 1989 and 1995, Kawasaki Heavy Industries (KHI) built 15 Jetfoil 929-117 hydrofoils under license at its yard in Kobe.

The newest Jetfoil operator in Japan, Cosmo Line, introduced its first vessel in 2003 and now has a fleet of three in service between Kagoshima, on the southwestern tip of Kyushu, and the islands of Yaku and Tanegashima. Jetfoil 929-117 Rocket 2 was originally delivered by Boeing Marine Systems in 1984 to a private owner in Saudi Arabia and rebuilt by KHI JPS prior to entering service with Cosmo Line in 2005. All are currently in service with Japanese operators, along with five Boeing Marine Systems Jetfoil 929-115s and two BMS Jetfoil 929-117s. Three

Jetfoil 929-117 Rocket 2

BMS Jetfoil 929-100s are also operated by a Korean company between South Korea and Japan.

Selichi Nishimura of KHI JPS gave conference delegates a review of his company's hydrofoil experience in 'Twenty Years with Jetfoil'. The role of KHI JPS, he said, is to repair hulls and machinery, overhaul gas turbines, supply spare parts and offer technical assistance to operators.

The company was established to provide product support to Japanese operators, so overcoming any language problems that might otherwise have occurred in dealing with an overseas company. KHI JPS's achievements, Selichi Nishimura said, include es-

Continued on Next Page

JAPANESE JETFOILS
(Continued From Previous Page)

tablishing an abundant stock of parts and a fast supply chain, including holding spare engines and a spare bow and stern strut and foil at the Kobe yard, and developing a collision avoidance system.

In recent years, Japanese operators have been acquiring earlier Jetfoils built by Boeing Marine Systems and since 2002, KHI JPS has completed major refurbishment of six of these vessels.

One of the Jetfoils rebuilt in 2005, a 21 year old 929-117 model, had been delivered to a private owner in Saudi Arabia and had been laid up for more than ten years after it ran aground on a reef. The vessel arrived in Kobe minus its bow foil and a severely damaged hull.

Several Jetfoils operating between Japan and Korea have been damaged in collisions with whales. In one incident, the bow strut became detached from the vessel and was later salvaged from the sea by KHI JPS. Seiichi Nishimura explained that this was a preferable option to building a new strut and foil, which is a lengthy and expensive process.

In an attempt to avoid collisions with marine life, KHI JPS is currently working on a sonar system to identify whales and an underwater speaker system to deter them from approaching vessels.

All 15 Jetfoils built by KHI are now based in Japan. Only two were ever exported, to Spain, and these were laid up in 2005. Acciona Trasmediterránea sold one to a Japanese operator last year and its remaining vessel also returned to Japan earlier this year.

This had been the last Jetfoil remaining in Europe, where a total of 12 had operated since the first one entered service in 1977. Five of the vessels are now in Japan and the other seven are operating between Hong Kong and Macau.

Although the Jetfoil fleet in Japan has continued to grow, Seiichi Nishimura said that several of the country's fast ferry operators are experiencing commercial pressures due to the increasing cost of fuel and falling populations on the remote islands.

However, the 22 Jetfoils are still carrying 2.8 million passengers each year and are an indispensable link between the mainland and remote islands". What is needed, and expected, Seiichi Nishimura said, is financial support from the Japanese government.

ALL AMERICAN MARINE DELIVERS FOIL ASSISTED CATAMARAN

From Fast Ferry International, December 2008

All American Marine has delivered a second Teknicraft Design 25m foil assisted catamaran to Kenai Fjords Tours. The vessel, Orca Voyager, left the builder's yard in Bellingham, Washington, on its delivery voyage to Seward, Alaska in September, 2008.

Teknicraft Design All American Marine 25m. Foil Assisted Catamaran *Orca Voyager*

Kenai Fjords Tours' first Teknicraft Design 25m foil assisted catamaran, *Aialik Voyager,* entered service in Spring 2007. The two twin-deck boats are identical. Both are built to US Coast Guard Sub-chapter T regulations for a maximum of 149 passengers, are fitted out with 150 internal Eknes tip-up seats and 24 external Beurteaux seats, and powered by two Caterpillar C32 ACERT diesels driving Osborne five-bladed fixed pitch propellers via ZF 2500A gearboxes.

Shortly after Orca Voyager was launched, the builder reports, "All American Marine (AAM) entered into contract negotiations with the Seldovia Village Tribe to construct a ferry to operate between the village of Seldovia and the city of Homer in Alaska.

"Upon touring *Orca Voyager,* represent natives of the Seldovia Native Association were convinced that a new vessel like *Orca Voyager* would be suitable for their own ferry operation and signed a contract with AAM to begin construction.

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

ALL AMERICAN MARINE
(Continued From Previous Page)

Like Kenai Fjord Tours, Seldovia is located on the Kenai Peninsula and the vessel is well suited to operate in the harsh Alaskan environment. AAM has already started construction on the new Seldovia Bay Ferry and is expecting to deliver the vessel in the early summer of 2009.

"The semi-displacement catamaran hulls of the vessels have a combined symmetrical and asymmetrical shape, bow wave piercer, and hydrofoil system. The vessels' design offers passengers a smooth ride and extreme comfort. The catamarans are also highly stable and have outstanding seakeeping ability.

"For the operator, the most valuable feature of these vessels is the excellent fuel economy, which consumes approximately the same gallons per nautical mile throughout the cruising speed range of 20 knots up to 27 knots. Fully loaded, Orca *Voyager* reaches a top speed of 31 knots and cruises efficiently at 27 knots."

30 YEARS AGO –JETFOIL SERVICES

From Fast Ferry International, December 2008

The November and December 1978 issues of *Hovering Craft & Hydrofoil* were combined into a single magazine. An article in *H&H* detailed the background planning for the proposed Boeing Jetfoil cross-Channel service which will operate under the name of 'SeaJet, the ship that flies', [and] will run three return services daily. The journey time will be one hour and forty minutes.

Trains and terminals were key to a completely new Boeing Jetfoil cross-Channel service between Brighton Marina and the French port of Dieppe that was due to start in April 1979.

P&O Jet Ferries Operated Jetfoil *Flying Princess* for 16 Months in 1977-1978

"By agreement with conventional surface transport systems between the two terminals and Paris and London respectively, a London-Paris service can be operated in 51/2 hours. This will be the fastest form of surface transport linking the two city centres.

"The service is just five and a half months away. During that time the two terminals have to be constructed, staff have to be employed, equipment and spares ordered, a reservation and administration system established and the whole concept to be marketed. A truly formidable task. However such is the enthusiasm for the project that it is quite clear that everything will be ready in time." It was.

Another article reported on P&O's experience on a Jetfoil route between London and Zeebrugge, Belgium, that had been withdrawn in September 1978 and the company's plans to open a new cross-Channel service between London and Ostend.

"P&O Jet Ferries stresses that the London-Zeebrugge service introduced on June 1, 1977 was purely experimental. In a notice to passengers the Company says that the 'charter service with the *Flying Princess has* been successful and passenger response has been good, but with one craft and only temporary facilities, the quality of the service has not been as good as we would wish. However, all the lessons learned during the experiment will be incorporated in our plans.'

"The company is very satisfied with the overall performance of the Jetfoil 929-100. Boeing Marine was heavily involved in the Zeebrugge service. It supplied technical support, the operating crew and the maintenance team.

"Serious water jet ingestion problems were experienced in the River Thames during the first few months of the service. The majority of debris was picked up while Jetfoil was alongside the pier at St Katherine's Dock.

"The problem was solved by Boeing fitting a smaller mesh grille in the water jet intake, building debris deflectors onto the hull and incorporating an air blown down system. P&O points out that there were no ingestion problems at the Zeebrugge end of the service.

"Between January and September 1978 the service achieved a weather reliability in excess of 93 per cent and an overall reliability of 87-89 per cent, which P&O consider very acceptable for an experimental one-craft service.

Because Jetfoil 007 was a foreign flag craft operated by a non-British crew, it had to carry two pilots on every service, one for the Thames Estuary and one for the river itself. About 75 per cent of services on the 136

Continued on Next Page

30 YEARS AGO
(Continued From Previous Page)

nautical mile route were completed within [the] 3-3/4 hours timetabled.

"The shortest journey was 3 hours 21 minutes and the longest 4 hours 6 minutes. P&O says that the fastest time could have been beaten on several occasions but the craft would have arrived before the Customs so the journey along the Thames was completed at reduced speed.

"One problem with operating in the Thames is that Jetfoil requires about 22 feet of water to ensure a safe ditching in an emergency stop. In the upper reaches of the River this is not always available so within one hour each side of low water the craft has to be operated in the displacement mode at about 8 knots for approximately 40 minutes. Consequently, during the Zeebrugge service Jetfoil came off foil in the Thames an average of twelve times a month."

However, "Passenger reaction to Jetfoil was excellent, 98 per cent of those asked during a survey period said they would use the craft again" and "P&O Jet Ferries believes that the Company has carved out a new market".

DEMANDS FOR ECO CREDENTIALS GROW IN POPULARITY

From Ferry Technology, June/July 2008

By Dag Pike

A Turkish team has been highlighting the merits of its *Volitan* hull with solar-powered sails, while Fjellstrand has just delivered the 34m catamaran *Miljodronningen* to the Green Warriors of Norway

In the true spirit of green operations there is an increasing focus on the use of solar power. A 14m solar-powered boat has made the first solar crossing of the Atlantic and numerous small passenger boats operating on rivers, canals and lakes use only solar power. Now a Turkish team has developed designs for a revolutionary solar-powered vessel designed to operate in winds of up to 60 knots, making it a true sea-going craft.

The *Volitan* Sun and Wind Powered Hull

The Volitan hull is 33m long and has two 'wings' angled up at 45 degrees. These wings are covered with solar panels to harness the sun's power, but they also act as sails to harness wind power. A long thin hull has been designed for efficiency and it is supported on two underwater angled fins that generate lift. Electric propulsion motors arc contained at the extremities of these fins. Both the above and below water fins can be folded for operations in more extreme sea conditions.

It is estimated that the solar panels will produce up to 10kW of power so the propulsion energy is quite small and this vessel only becomes viable with the addition of the wind power. It is estimated that the *Volitan* should be capable of speeds up to 13 knots.

This speed potential is only possible because the hull is planned with a very light weight, and this emphasizes that at the present levels of solar technology, those vessels used for this method of propulsion have to be based on extremely efficient hull designs, with weight being a critical factor. As this *Volitan* shows, the only concepts that seem to be viable are the more extreme ones or those that operate on calm water.

In Norway, an environmental group has taken delivery of a fast catamaran built by Fjellstrand Shipyard. Ordered by the Green Warriors of Norway, this 34m-long vessel is claimed

Continued on Page 12

SAILOR'S PAGE

SPEED SAILING RECORDS TUMBLE AS DO SPEED SAILING CRAFT

Late last year saw a string of speed sailing records broken, and at the same time, a number of speed sailing craft have tumbled in various accidents while attempting speed sailing records:

L'HYDROPTÈRE CAPSIZE

In the 4th Quarter 2008 newsletter, we reported on new World Speed Sailing Records achieved by the *l'Hydroptère* team (www.hydropetere.com).

Unfortunately, during further attempts at such records, on the morning of 21 December 2008 *l'Hydroptère* capsized after reaching peak speeds of up to 61 knots in winds between 35 and 38 knots and gusts reaching 45 knots off Napoléon beach at Port-Saint-Louis-du-Rhône, which has been the base for the teams speed record attempts.

***l'Hydroptère* Floating After Capsize on 21 December 2008**

The sea, being considerably choppier than the previous days, may have contributed to the capsize. Fortunately, there were no serious injuries and reportedly the crew suffered only a few scratches. The capsized craft was subsequently towed to Fos sur Mer.

The team remain committed to challenging the new absolute speed record of 50.57 knots (over 500m) as well as an open sea 24 hour distance record.

By late January, *l'Hydroptère* had been disassembled to facilitate repair of damaged components while at the same time further optimization will be undertaken on the design. Repairs to the composite hull are now underway in a dedicated 'tent' surrounding the hull at the Foselev Marine shipyard in La Seyne sur Mer allowing temperature and humidity to be controlled.

In the time that repairs are being undertaken, the foils will also be modified. While the lower portion of the foils will remain unchanged, as they have demonstrated the necessary performance for a design speed of 55 knots, the upper portions will be modified to make them more sturdy for sailing in waves.

It is planned that *l'Hydroptère* will be rebuilt by Spring.

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SAILROCKET BREAKS B CLASS WORLD SPEED SAILING RECORD THEN FLIPS.

The *Vestas Sailrocket* team was briefly the world's fastest sailing boat (not including windsurfers and kite-boats) during December 2008. While a planing hull rather than being foil supported, your editor feels all craft which achieve such records deserve recognition in this column. The WSSR Council has ratified a new world B Class speed sailing record for the solid wing sail *Vestas Sailrocket* piloted by Australian, Paul Larsen. This was achieved on 3rd December 2008 at Walvis Bay, Namibia over a measured distance of 501.9 metres with an average speed of 47.36 knots achieved.

The record for this class was previously held by Simon McKeon sailing *Yellow Pages* in 1993 which achieved 44.65 knots. Paul Larsen's commentary about the record run and a subsequent attempt to improve on it the same day to, which resulted in flipping of the craft, is provided on the comprehensive *Vestas Sailrocket* website (www.sailrocket.com):

Continued on Next Page

"There was enough wind to sail a 'flattish' trajectory onto the course. I built enough apparent to attach flow onto the wingsail with only a slight dip, we were off. I was quick to sheet in and get on the main flap whilst simultaneously switching from foot to hand steering. A real one man band affair. *Vestas Sailrocket* was going hard and I had tunnel vision… Control was excellent. At one stage a gust pulled the nose away and I brought it gently back up. The main flap was in but I noticed that the wing angle was still a little eased. It was too late to change. The boat was smoking… but balanced. I held onto it until I was certain that a solid 500 meter average was recorded… and then dumped the flap and eased the wing… I pulled on the leading edge bridle to slow her down by feathering the wing and it worked a treat. Hiskia caught the boat on the shore. I was pretty surprised by the data on the GPS. It read a top speed of 48.90 knots and an average of 47.35! I told the team over the VHF that they were now looking at the fastest boat in the world and congratulated Malcolm on designing it."

***Vestas Sailrocket* sailing at over 50 knots in perfect control.**

"It was only later when we checked the two onboard GPS systems that we saw we had actually hit sustained speeds over 50 knots peaking at 51.76 knots. We averaged 46.4 knots over 1000 meters. The mean wind speed was around 22 knots."

"The wind was gusting to 25 on the second start indicating an average of around 22-23 knots… no more. I did an even flatter start up procedure focusing on getting the wing into 10 degrees as soon as she accelerated… and bloody hell… did she accelerate. apparently she pulled 0.35 G's all the way up to 52 knots before the nose lifted. I expected her to step sideways as before but not this time. The nose floated higher… and then it went quiet… I was flying. I waited for some sort of touchdown… somewhere… but it didn't come. the nose just kept going up until I was looking vertically up at it! There was no rolling and I was just a passenger. It was still quiet… and strangely dry as we continued the loop. I sort of knew I was inverted. It all seemed to take so long. I consciously thought "righto boy, when this thing smacks down… get the hell out of it because you're gonna be upside down"!!!

I smacked down hard. Like someone big had full palm slapped my helmet with all their might. I was out of that boat in an instant. I was a bit beat up and bruised… but alright. I lay on the upturned hull and got my head together. My helmet was broken but I let everyone know I was OK."

***Vestas Sailrocket* Flips on Attempt to Increase Speed Further**

VOLITAN
(Continued From Page 9)

to be the most environment-friendly ship ever built and it is planned for use as a floating conference center as well as for coastal surveillance and as a research ship.

The design for the new *Miljodronningen* has been based on Fjellstrand's Flying Cat Type 35 class and it has a 10.4m beam. The basic concept has been modified, with the hull "ice-strengthened" for operations in northern areas such as the Barents Sea and the coasts of Spitzbergen. it has also been fitted with a helicopter platform and a moon pool so that it can undertake a wide variety of projects in green research.

Propulsion power is provided by twin 75kW (100 bhp) diesel engines that are coupled to conventional shaft and propeller systems. The maximum speed is a modest 25 knots in keeping with the 'green' requirements. At present, these engines operate on conventional diesel oil, but the catamaran has been designed with the possibility of burning alternative fuels in the future.

The main role of *Miljodronningen* is a combination of education and research. The passenger and conference room capacity is for 50 people and with its moon pool the catamaran will be able to undertake subsea research operations. When operating a remote operated vehicle (ROV), it will be possible to recover seabed and water samples from depths of 200m, and there is an onboard laboratory for analysis.

The NKr41.2 million that it cost to build this craft has come mainly from private and corporate sponsors, with a Norwegian bank coordinating the loan structures. To cover some of the operational costs, this vessel will be engaged on the spot market for short term use by government and private companies.

Whilst there are many "green" ships operating around the world on environmental missions this new vessel the Green Warriors is thought to be the first to make use of fast ferry technology.

Editor's Note: Although this vehicle does not have foils (yet), it is interesting to see that innovation is going on someplace in the world!

IHS OFFICERS 2008 - 2009

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Mark Bebar	Vice President
George Jenkins	Treasurer
Ken Spaulding	Secretary

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

ALISWATH NEWS

By Lorenzo Bonasera, IHS Member

As a follow-up to the featured article in the Fourth Quarter 2008 Newsletter, Lorenzo Bonasera reports as follows: Shown here is a recent picture taken in Rodriquez Yard, which shows the progress being carried out on the AliSWATH prototype and the Hydrofoil 1 (first of two different T-Foil projects).

AliSWATH and Hydrofoil 1

I have downloaded the photo from the site "NEA" (naviearmatori.net). One can appreciate the different dimensions of two projects .....but the small T-foil (which looks small, if compared with the AliSWATH) is larger and longer than a Foilmaster!!

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The NEWSLETTER

International Hydrofoil Society

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

Editor: John R. Meyer | Second Quarter 2009 | Sailing Editor: Martin Grimm

NEW ROLES FOR METEOR HYDROFOILS

From Fast Ferry International, March 2009

Between 1957 and 1991, more than 1,000 hydrofoil ferries were built in the USSR. The first to appear, the 27m Raketa, was produced in the greatest numbers. According to Hungarian operator Mahart, 389 were delivered between 1957 and 1976.

The second Soviet hydrofoil to enter series production, the 34m Meteor, did not appear in such numbers but construction continued for 43 years. *Meteor-1* was launched in 1960, the design was still being built when the Soviet Union collapsed in 1991 and production continued for another 12 years after that.

The total number produced has never been publicly revealed but at least 160 were delivered to Soviet operators between 1960 and 1991. The total is probably greater, the highest numbered vessel to enter service in the USSR was *Meteor-282.*

From Ferry to Luxury Motor Yacht, *Meteor-235* Shortly After Conversion in 2005

Many of the Meteors have now reached the end of their operational life as ferries and have been laid up or scrapped. Several of those in Russia, however, have been converted for new roles, some of them unexpected.

See Meteor Hydrofoils, Page 3

SUSTAINING MEMBERS

YOUR 2009 IHS DUES ARE DUE

See Full Announcement on Page 2

INSIDE THIS ISSUE

PRESIDENT'S COLUMN

To All IHS Members

I pointed out the flurry of commercial hydrofoil activity Worldwide, but mostly in the Eastern Hemisphere, as depicted in several articles in the Fourth Quarter 2008 and First Quarter 2009 issues of the IHS Newsletter. Now there seems to be some activity in the Eastern Hemisphere as recorded in this issue of the NL. These vehicles are all foil-assisted catamarans which have taken hold, and have been recognized as having many advantages over conventional "boats."

YOUR 2009 DUES ARE DUE IHS Membership options are: US$20 for 1 year, $38 for 2 years, and $54 for 3 years. Student membership is still only US$10. For payment of regular membership dues by credit card using PAYPAL, please go to the IHS Membership page at <http://www.Foils.org/member.htm> and follow the instructions.

IHS Members in the Washington, DC area were fortunate to be able to attend a Joint Meeting of the IHS and the SNAME SD-5 Panel on 30 April. The presentation was "The T - Craft Transformable Amphibious Craft" by Kelly Cooper, Program Officer, Office of Naval Research. The T-Craft Program is an ONR effort to develop a prototype transformable amphibious craft. The T-Craft will be capable of self-deploying from an intermediate support or advanced base to a sea base (2500 nm), taking on cargo in high sea states (SS 4), transporting this cargo to the beach (up to 500 nm unrefueled), then transforming into a completely amphibious vehicle and delivering its cargo "feet dry" on the beach. A copy of the presentation is available on the IHS website.

I am pleased to report that the year 2009 has started off with a flurry of new members; namely 12 in the first 4 months of the year. But all members are still 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: (membership @foils.org)

During this past Quarter High Caliber Solutions (HCS) has re-started work on putting together an IHS Newsite, called "Hydrofoil World". However progress had been slow and HCS is working through some of the glitches. I will keep you informed.

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), Bill Hockberger (w.hockberger@verizon .net), or Ken Spaulding (secretary@foils.org).

John Meyer, President

WELCOME NEW MEMBERS

Leigh McCue – Leigh is an Assistant Professor in Virginia Tech's Department of Aerospace and Ocean Engineering and an affiliate to the VT Department of Engineering Education. Her research interests are in nonlinear and chaotic vessel dynamics including capsize, parametric rolling, and sea-based aviation operations largely involving analytical and numerical approaches. This work has been supported by ONR, CSC, and NSF. Additionally, Dr. McCue has twice participated in the ASEE-ONR Summer Faculty Research Program to continue her work in collaboration with researchers at the Carderock Division of the Naval Surface Warfare Center.

Dr. McCue received her BSE degree in Mechanical and Aerospace Engineering in 2000 from Princeton University. She earned her graduate degrees from the University of Michigan in Aerospace Engineering (MSE 2001) and Naval Architecture and Marine Engineering (MSE 2002, PhD 2004). At the 2007 Virginia Tech College of Engineering Dean's Awards she received an 'Outstanding New Assistant Professor' award. In 2008 Dr. McCue received both an NSF Faculty Early Career Development (CAREER) grant and an ONR Young Investigator Program (YIP) grant.

LCDR CHRISTOPHER ROSSBACH, USN-RET. - Chris was formerly the Officer in Charge, Mobile Logistics Support Group, for the U.S. Navy hydrofoil squad-

Continued on Page 12

METEOR HYDROFOILS
(Continued From Page 1)

HISTORY

Like all the country's hydrofoil ferries, the Meteor was designed in Gorky by the Central Hydrofoil Design Bureau. The earliest vessels were built locally at the Krasnoye Sormovo yard and production lines were later opened at the Gorky yard in Zelenodolsk and the Khabarovsk yard on the Amur river.

As the Meteor was designed for service on the USSR's relatively sheltered rivers, lakes and reservoirs, very few were exported during the 1960s and 1970s. The first Soviet hydrofoil to appear overseas in any numbers was the Kometa, a coastal waters design that was developed from the Meteor.

Earliest Meteor operators outside the USSR were based in Czechoslovakia and Hungary but the combined fleets of these companies totaled only seven vessels. During the 1980s and 1990s, seven other Meteors entered service in Greece and the Netherlands, and possibly more than 25 on the rivers of China and Vietnam.

Of the Meteors remaining in the former republics of the USSR, at least 80 are still in service each summer, between 30 and 50 are laid up and at least 15 have been scrapped. Four others are now permanently ashore, two have been preserved and two have been converted into cafes.

CONVERSIONS

Other vessels remain In service in new guises. The standard capacity of the Meteor is 112-124 passengers but four operating in St Petersburg carry only 78 passengers. In 2003, the 300th anniversary of the foundation of the city, these were refitted with VIP interiors and carried visiting dignitaries on the River Neva. The vessels are now operated on specialist excursions and charters.

LUXURY MOTOR YACHT

A far more ambitious conversion of both the exterior and interior of the 16 year old *Meteor-235* was undertaken in 2005. A commission to restyle and refit the vessel as a luxury motor yacht was awarded to Avenir K, a Russian design company.

Midships Saloon of one of Four Meteor VIP Hydrofoils Operated in St. Petersburg

The work, which took six months to complete, included restyling the forward superstructure of the vessel, installing new windows along both sides and replacing part of the aft superstructure with a sun deck, visor and a hydraulically operated swimming platform.

The bow saloon was refitted with two bedrooms with bathrooms and the midships saloon was refitted as a dining room featuring a 12 place table and sofa seating aft. Food is prepared in a kitchen located further aft on the port side. The remaining section of the aft saloon is equipped with sofa seating and a bar.

The performance of the vessel is reported to be the same as the ferry version, a cruising speed of 35 knots and a maximum speed of 43 knots.

CAFÉ?

More recently, another Meteor was lifted ashore onto a pontoon in Sverdlovsk, Krasnoyarsk, in central Siberian Russia and refitted, apparently for a more egalitarian use than *Meteor-235.*

In December 2007, the Meteor Café opened its doors for the first time. However, nine months later, the local authorities launched an investigation into the business that was actually being conducted on board the hydrofoil.

Suspicions were aroused by the form of marketing adopted by the owners of the Meteor Café, large billboards featuring photographs of young ladies in various states of undress. This led the authorities to conclude that the principle business activity of Meteor Café was related not to coffee but to exotic dancing or, as the authorities put it, something even worse.

SUNKEN METEOR

In the Canary Islands, a Meteor became the subject of a more wholesome pastime when it sank in 2003. The vessel was at anchor off the coast of Gran Canaria while on a delivery voyage when a storm passed through the area and lifted it onto rocks.

The holed hydrofoil came to rest on the seabed in 18 metres of water and became a popular site with divers as it was possible to enter the wreck and it attracted a rich variety of marine life.

FOIL ASSISTED CATAMARAN ENTERS SERVICE IN HAWAII

From Fast Ferry International, January-February 2009

A 25m foil assisted catamaran, *Catalina Adventure*, entered service in Hawaii at the end of December, 2008 on a service called "The Boat" route between Kalaeloa and Honolulu. The leased vessel, designed by Viking Fast Craft Solutions and built by Geo Shipyard, was delivered to Californian operator Pacific Adventure Cruises in 2007.

Catalina Adventure has replaced one of two International Catamarans Nichols Brothers 22m catamarans operated since September 2007 by Hornblower Marine Services on behalf of the City and County of Honolulu.

Geo Shipyard 25m Foil Assisted Catamaran *Catalina Adventure*

The City of Honolulu reports that the two catamarans carried more than 83,000 passengers during the first 16 months that "The Boat" service was operating.

Announcing the introduction of the new ferry, Honolulu's Department of Transportation Services said, "*Catalina Adventure* is expected to be more comfortable and reliable, and also more fuel efficient. The vessel will replace the 20 year-old *Rachel Marie.*"

The other International Catamarans 22m ferry leased by the City and County of Honolulu, *Melissa Ann*, will continue to be operated on the Kalaeloa-Honolulu route.

COASTAL SERVICE LAUNCHED IN TRINIDAD

From Fast Ferry International, January- February 2009

A long awaited service along Trinidad's west coast from Port of Spain was introduced on December 1, 2008. Four vessels are being operated by Hornblower Marine Services under contract to the Trinidad and Tobago government's National Infrastructure Development Company. Last year, the National Infrastructure Development Company (NIDCO) purchased three Teknicraft Design 27m foil assisted catamarans from VT Shipbuilding and a Marinteknik Shipbuilders 45m catamaran from a Turkish operator.

Three Technicraft Design 27m Foil Assisted Catamarans have Entered Service in Trinidad

The three sister vessels (*HC Katia, HC Milancia and HC Olivia*) were built in 2004 and originally leased for two years for service in France and the Caribbean. They arrived in Trinidad from the United Kingdom in June 2008. The larger catamaran, Su, was launched in Singapore in 1996 and operated in Guadeloupe until 2005.

Four daily return services have initially been timetabled between Port of Spain and San Fernando. Scheduled journey time is approximately 50 minutes in each direction. The second phase of the project includes extending the route north to Point Cumana, south to Point Fortin and introducing additional stops.

Commenting on the planned expansion, Hornblower vice president of operations Gary Seabrook said, "The service is commuter oriented and will begin operations with four vessels, with four additional vessels added over the next two years.

"Hornblower Marine Services Trinidad will operate the ferries on behalf of the NIDCO. The 'water taxi service' is vital to the region to alleviate vehicle traffic on the national roadways and to improve community and business productivity. The service is looking to ultimately carry 9,000 passengers on approximately 34 daily trips!"

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VEEM LIMITED

Courtesy of Luke Silich; Marketing Coordinator for VEEM

VEEM began manufacturing propellers in 1956 and has since delivered tens of thousands of propellers to meet the needs of a multitude of users in the leisure, high speed naval and work boat markets.

VEEM High Performance Propellers has recently launched its patented Interceptor Propeller™ technology which lets one adjust the effective pitch of its fully CNC machined propellers.

VEEM's Interceptor propeller allows the pitch of the propeller to be adjusted quickly and accurately, without mechanically compromising the fully CNC contoured blade surface that is standard on all VEEM propellers. This advanced, patented design operates by fitting adjustable height strips into the trailing edge of the propeller blade. It is a unique method of adjusting pitch which allows the maximum performance potential of the vessel to be obtained upon launch, and throughout the life of the vessel.

Interceptor Prop with Strips

The Interceptor design is an adjustable protrusion on the trailing edge of the pressure face of the blade to produce a surface discontinuity. The protrusion is arranged with an included angle equal to or less than 90 degrees which causes a "wedge" of circulating fluid to be captured. This "wedge" of fluid induces a local increase in lift in this region of the foil section, without the associated frictional drag associated with alternative foil sections. Furthermore the effective pitch of the blade foil section is dependant on the relative height of the Interceptor strip.

The ability to adjust the relative height of the protrusion via interchangeable strips allows the effective pitch of the propeller to be adjusted to suit the specific application the propeller operates in.

The VEEM Interceptor™ ensures that maximum vessel performance is always able to be obtained and can be adjusted to take into account the following variables that effect vessel performance and engine RPM:

- Vessel weight variation during construction

- Marine growth on hull and/or propellers

- Added equipment or weight, such as a tender craft

- Engine power variation (generally +/- 1-3%)

- Addition of vessel structures, such as fishing towers

- Addition of ride control equipment, such as roll fins

- Operating environment, such as hot tropical regions

The VEEM Interceptor™ strips can be adjusted from a protrusion height of 3.0mm down to 0.0mm (flush) in 0.5mm increments. The amount of propeller pitch that this adjustment equates to depends on the particular application. On most applications, the VEEM Interceptor™ is able to provide a range of adjustment of approximately +/- 1.5" to +/-2.0" when starting from a mid-height strip. On most applications, each increment is capable of adjusting engine RPM by approx 15-25 rpm depending on vessel and engine characteristics.

VEEM also manufactures hydrofoils for Austal Ships based on an Austal Ships foil design. The foils are a complex hollow-cast foil section made from NiBrAl material, and are assembled from several parts.

This T-Foil was Manufactured in Late 2005

It was manufactured for a large Trimaran with a length of 127 metres and a speed of 40.5 knots. Their largest T-Foil to date measures 13.5 square metres, weighs in at 10.7 tonnes, has a spar (wing) length of 6.2 metres and was built in 6 modules before being assembled in their factory in Canning Vale. Six months in

Continued on Next Page

VEEM LIMITED

(Continued From Previous Page)

A T-Foil was Mounted on *Benchijigua Express*

the making, a T-Foil of this size was a giant leap forward in their casting, machining and overall engineering abilities. The T-Foil worked extremely well improving the trim of the Trimaran, making the ride more pleasant for passengers and enabling higher and more economical speeds.

The T-Foil operated by way of an Aileron which was actuated according to the measured swell the vessel encountered, allowing the bow of the vessel to be lifted in and out of the sea as required.

PURSUING A MORE EFFICIENT THRUST

From Passenger Ship Technology, December/January 2008/9

By Doug Woodyard

Interaction between a vessel's propeller and rudder contributes to overall energy efficiency, and optimum performance can generally be fostered by a single integrated design.

Recent co-operation between Wartsila and German rudder specialist Becker, which has resulted in the development of the Energopac concept, underlines this fact. The new system - which incorporates a streamlined fairing cap and a rudder system with a bulb for efficiency embraces a number of elements which each manufacturer has adapted to complement the technology provided by the other.

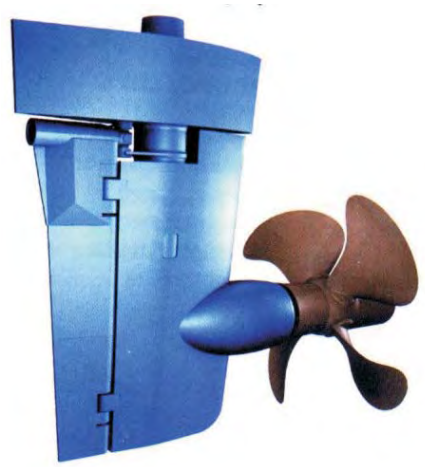
The intention is that the equipment package would be custom-designed for each application. However, it is claimed that Energopac will improve overall efficiency performance by between 2 to 9 per cent, without compromising manoeuvrability or comfort.

Kamewa CP-A Propeller Hub

Ropax ferries with high power density propulsion systems and noise limit requirements are considered excellent candidates for Encrgopac integrated propeller/rudder installations. The power requirement can be significantly reduced for a typical 25MW plant, yielding fuel cost savings of US$125,000 a year or more per percentage point in power reduction.

Propeller design has improved significantly over the years as refinements and the prediction of cavitation and pressure pulses can be assessed well before expensive scale tank testing, reports Carnival Corporate Shipbuilding's Chris Joly, He suggests, "In all ships, and particularly in cruise tonnage, efficiency has to be balanced against noise, and the responsibility for achieving the specified noise levels is contracted to the shipyard."

As a result, he adds, given the generally high passage speeds overnight between ports, naval architects tend to be conservative with design and very aware of the high standards on vibration and noise required by the cruise operator: typically, maximum acceleration of 100 mm/sec 2 and velocity 1.5 mm/sec for frequencies below 5Hz. Mr. Joly says, "We continue carefully to seek the optimum solution in propeller design."



Energopac Integrated Propeller-Rudder System

Hubs for CP propellers are mature products and development is by evolution rather than by revolution. By examining all the mechanical and hydrodynamic aspects of its established Kamewa XF-5 hub design and applying the latest analysis tools and techniques, however, Rolls-Royce was

Continued on Next Page

PURSUING A MORE EFFICIENT THRUST
(Continued From Previous Page)

able to improve the power-to-weight ratio by 20 per cent without compromising strength.

An added benefit for the resulting Kamewa CP-A hub is greater wearing surfaces for the blade foot bearings, thus reducing loads on these elements to increase strength and wear resistance. The new hub shape also reportedly reduces drag and delivers benefits in propulsive efficiency and/or maximum speed.

The operating principle of the XF-5 hub is retained, based on a simple, compact and strong arrangement in which the pitch of the blades is set by a hydraulic piston connected to a crosshead in the hub carrying slide blocks riding on pins in the blade feet.

Traditional for Rolls-Royce CP propellers, the blades bolt onto the hub and are individually designed to suit the vessel and its operating conditions. Two main variants of the hub are offered: the CP-A standard version covers applications with speeds up to 30 knots while the CP-A/H version targets faster vessels.

ORDERS AND DELIVERIES

From Fast Ferry International, January-February 2009

The number of fast ferries delivered during 2008, a total of 44, may seem surprisingly low considering that a year ago Fast Ferry International reported 69 vessels were on order for delivery in 2008 and 2009, particularly as five vessels were both ordered and delivered in 2008.

One reason for the discrepancy is that changes in specifications for six vessels delivered in 2008 resulted in their full load service speed dropping below 25 knots. Another is that orders for four vessels either lapsed or the vessels are now being built for stock.

The major reason, however, is that the delivery of 12 vessels due to enter service in 2008 has slipped to 2009. Conversely, two catamarans scheduled for completion in 2009 were delivered towards the end of 2008.

The delayed deliveries have boosted the number of outstanding orders of course, although the total was only a relatively low 47 at the end of 2008. Of these, 26 were ordered during 2008, fewer than anticipated as two operators had been expected to place contracts for 24 catamarans but one opted for a medium speed design and the other postponed an expansion of its present fleet.

Even so, the figures for 2008 deliveries and outstanding orders are far from impressive. The 44 vessels delivered is the lowest total since 2005 and the 47 vessels on order on December 31 is the lowest since 2000. The combined total of 91 is also the lowest since 2000.

On a brighter note, a notable percentage of deliveries and orders involve larger vessels; there has been little evidence of operators canceling orders or delaying deliveries, as has been experienced recently by builders of more conventional ships; and an encouraging number of operators are believed to be close to confirming contracts for fast ferries.

A fast ferry is regarded as a vessel capable of carrying at least 50 passengers, or an equivalent payload of passengers and cargo, at a minimum service speed of 25 knots. Medium speed and military versions of fast ferry designs are not included

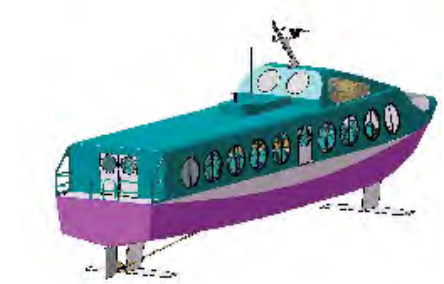
Deliveries and orders at December 31

	Deliveries	*Orders*	*Total*
Catamarans	39	41	80
Hovercraft	—	—	—
Hydrofoils	1	—	1
Monohulls	3	2	5
Wavepiercing catamarans	1	4	5
Totals	**44**	**47**	**91**
Passenger ferries			
50-99 seats	9	5	14
100-149 seats	6	3	9
150-199 seats	4	7	11
200-249 seats	3	6	9
250-299 seats	2	3	5
300-349 seats	—	3	3
350-399 seats	1	6	7
400-449 seats	10	4	14
450+ seats	1	3	4
Totals	**36**	**40**	**76**
Passenger/vehicle ferries			
5-49 cars	3	3	6
50-99 cars	2	—	2
100-149 cars	—	2	2
150-199 cars	2	—	2
200-249 cars	—	—	—
250-299 cars	—	1	1
300-349 cars	—	—	—
350-399 cars	1	1	2
Totals	**8**	**7**	**15**

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

MAPC UPDATE

Sustaining Member, Maritime Applied Physics Corporation (MAPC), has developed a 30-meter hydrofoil design and is actively marketing this vessel in both passenger and crew-boat variants. The two-strut diesel-driven 37-knot hydrofoil features an inclined shaft with strut heights dictated by the operating service. MAPC hopes to begin construction of the first vessel in the fall of 2009 with delivery in the spring of 2011.



MAPC Hydrofoil Ferry Design

The past year finds our company somewhat sheltered from the economic downturn by a high percentage of U.S. Government contracts. Our company continues to perform 15 R&D contracts, several prototype contracts, and six production contracts, with the main office located in Baltimore, Maryland. Our revenue will grow by more than 20% in 2009.

Our staff consists of 65 engineers, technicians, and support personnel. Our technicians are experienced in fabrication of advanced electrical, electronic, and mechanical systems. Our technical staff includes mechanical, electrical, ocean, and aerospace engineers as well as personnel with degrees in naval architecture, physics, computer science, and material science at degree levels from bachelors to PhD. More information is available at: www.mapcorp.com

KVICHAK MARINE DELIVERS CATAMARAN TO NOAA

From Marinelink, March 2009

Kvichak Marine Industries recently constructed and delivered the *R/V Bay Hydro II*, a 54 ft foil-assisted catamaran, to the National Oceanic Atmospheric Administration (NOAA), which will be based at NOAA's facility in Solomons, MD. The contract was awarded early last year following a competitive tender process.

NOAA Foil Assisted Catamaran

NOAA will deploy the all-aluminum, 54 ft x 20 ft catamaran as their work platform for an ongoing, three-part mission:

- Conduct hydrographic surveys to update nautical charts and improve navigation on the Chesapeake Bay
- Utilize as a test platform for NOAA's charting efforts
- Public relations and educational outreach to schools from elementary to university level

The catamaran is fitted with a 3 ft x 7 ft moon pool cut through the main deck amidships. The moon pool is closed by a sliding structural hatch in the bottom of the tunnel and a top-mounted deck grate when not in use. NOAA will mount their sonar equipment on a retractable strut that is fabricated and installed by Kvichak. Additional sonar equipment includes two hull-mounted Airmar M42 dual-frequency transducers and an Interocean survey winch for towing side-scan sonar equipment.

Obtaining a top speed of about 30 knots, the catamaran is powered by twin MTU 6062 HK31 engines rated for 740 BHP at 2,300 RPM each.

HELMUT KOCK IS ALIVE AND WELL AT AGE 96

Bill Stewart, long-time associate of Helmut Kock, informed us that he has talked to Helmut on the telephone and had a great time reminiscing about developing the *Discoverer* in San Diego and the *Albatross* in Costa Mesa/Newport Beach, CA. Helmut says he is blind, as he tells us in his article on the website, but he is well taken care of. Bill looks forward to visiting him soon in San Diego to really go over old times.

Bill points out that there were two others who were important in the development of the *Albatross*. It was Ira E. Dowd, the man who really was the pioneer promoter of commercial hydrofoils in America, and responsible for getting Helmut Kock's hydrofoil built and certified by the U.S. Coast Guard to carry passengers for hire, the first ever in the U.S. Also, William R. Batley, Jr. helped develop the extrusion process and the welding techniques for the foils. He and Bill have remained close friends and occasional business associates since first meeting him on the *Albatross* project. Bill Stewart was chief financial officer of HYDRO-CAPITAL during that time arranging the financing of the project.

THE HARBOR WING AUSV

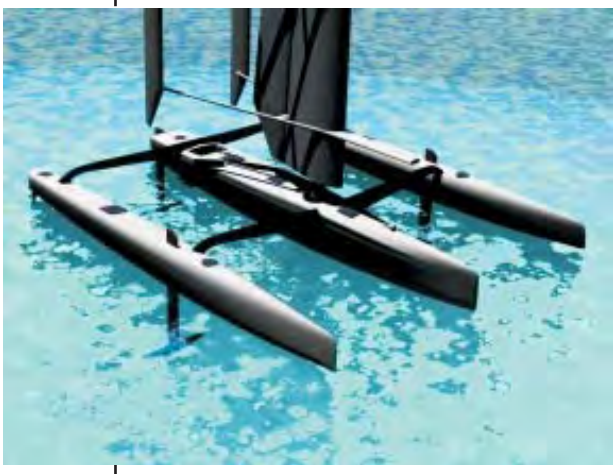
Courtesy of Ken Childress, Vice President, Business Development, Harbor Wing Technologies, Inc.

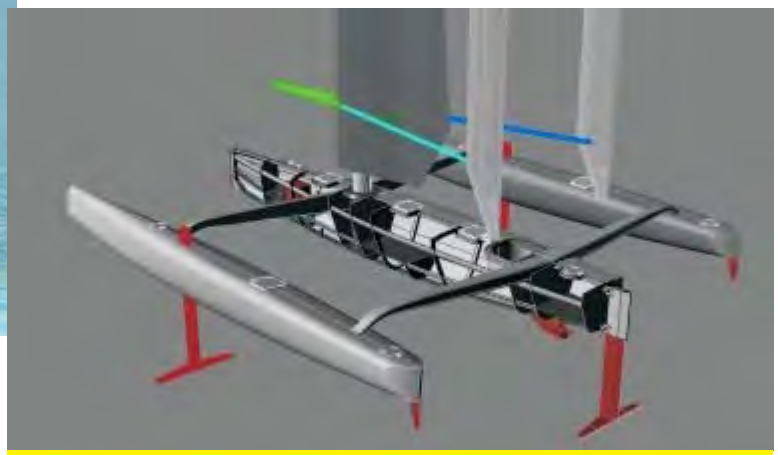
The Harbor Wing Autonomous Unmanned Surface Vessel (AUSV) is designed to use hydrofoils for enhanced seaworthiness, speed and stability in performing its long-range, open-ocean missions. Initially developed by Dr. Sam Bradfield and the Hydrosail team, the newly re-engineered and patent pending systems will be an integral part of the open-ocean AUSV. The hydrofoils are designed to be retractable with a maximum extended draft of approximately 8 feet. It is anticipated that the AUSV will be able to raise its hulls out of the water at about 15 knots. This will provide higher speed stability and an additional aspect of stealth. The hydrofoils will also act as stabilizers in rough waters when the vessel is "flat".

Overall View of AUSV

It is often that marine engineers underestimate the sea keeping abilities of inverted "T" hydrofoils arranged in such a wide triangular geometry on a lightweight composite platform. Few folks have any experience in this unique area of engineering. Smaller prototypes that were built consulting with Dr. Sam Bradfield, a pioneer in the sailing hydrofoil field, showed very impressive stability characteristics.

For example a 20 ft. LWL trimaran could breach the surface with all 3 foils at 25 kts. and reenter at steep enough angles to bring the boat to a sudden dead stop without subjecting the boat to pitch polling. If the crew was not physically holding tight on to something they usually ended up in the water 10-15 feet in front of the boat. There has been much recent engineering with hydrofoils being used only for high speed record attempts on sailing craft to the extent that one tends to forget about their other benefits. The moth class has dabbled with the benefits of hydrofoils but is still sailing at about wind speed and still using crew weight for righting moment. The hydrofoils on the Moth have allowed the reduction of wetted surface thus improving the class. It's not until the foils are placed on a wider platform that the boat speed to wind speed starts to climb. That is why Hydrosail has chosen the trimaran platform. Some of the platforms that Hydrosail has prototyped have approached twice wind speed. This occurs when the windward foil pulls down and the lee foil lifts dramatically increasing the righting moment. On the 23 Ft vessel EIFO that was developed by Hydrosail the lee foil was capable of producing a lift of 7,000 Lbs to lee and a pull down force of 3,500 Lbs to weather at her design speed of 35 Kts thus allowing the boat to sail close to twice wind speed.





View of AUSV Foil Arrangement

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SAILOR'S PAGE

WOTROCKET RE-BUILT

Meanwhile, following our Third Quarter 2008 Newsletter article on the *WotRocket* sailing hydrofoil challenger for the World Speed Sailing Record, the craft cartwheeled during its first official world speed record attempt in August last year on Botany Bay in Sydney, Australia.

In an 18-20 knot westerly wind *WotRocket* accelerated to an estimated 30 knots before the crew found themselves flying blind, with co-pilot Joe De Jock unable to ease the wing sail and Sean Langman unable to steer. Langman tried to bear away resulting in the craft pitch polling.

The damage was fairly substantial including a broken mast step, suspected delamination of the wing sail, broken fairing on the transverse beam, and damaged instrumentation.

By late November the craft had been re-built and will return to the water in 2009 to chase the new official world speed record set by a kite surfer.

KITE-BOARD OUTRIGHT SPEED SAILING RECORD RATIFIED

In a previous Newsletter we reported Alexandre Caizergues of France had provisionally set the new outright world speed sailing record of over 50 knots. This has now been ratified by the WSSR Council as follows:

Record: Outright World Sailing Speed Record. Board: Fone Prototype Speed; Kite: Fone Bandit Dos Speed 7sq m. Name: Alexandre Caizergues. FRA Dates: 4th October 2008. Start time: 15:35:00.84; Finish time: 15:35:20.06; Elapsed time: 19.22; Distance: 501m; Current: 0.1kts; Average speed: 50.57kts; Venue: Luderitz, Namibia.

MACQUARIE INNOVATION ACHIEVES 50KNOTS PLUS OVER 500M

Australia's speed sailing craft *Macquarie Innovation* achieved a significant milestone on 26 March 2009 when it transited a 500m course at Sandy Point in Victoria, Australia, at an average speed of 50.43 knots. In winds of only 24 knots, *Macquarie Innovation* reached a maximum speed of 54.23 knots (100km/hr) and became the first sailing boat (ie: other than kiteboards) to complete an official 500m run in excess of 50 knots. This record remains subject to ratification by the WSSR Council (www.sailspeedrecords.com) and is expected to be corrected to 50.08 knots due to tidal variances experienced along the course.

In exceeding 50 knots over 500m, the Macquarie Speed Sailing Team have achieved the goal that they set for themselves some 15 years ago. However they believe still higher performance is possible from the boat.

The WSSR Council has already ratified an earlier World C class speed record for Simon McKeon sailing *Macquarie Innovation* on 19th December 2008. Corrected for current, an average speed of 48.14 knots was achieved over a 500m course also at Sandy Point. The Macquarie Speed Sailing Team reports that this record was achieved in only 17 knot of wind, while speeds in excess of 51 knots were logged during the 20 second run.

This earlier record was achieved only days after the record *Vestas*

Continued on Next Page

***Macquarie Innovation* During the Record Breaking Run at Sandy Point, Australia. Photo by Steb Fisher**

MACQUARIE INNOVATION
(Continued From Previous Page)

Sailrocket achieved for B class boats as reported in the previous newsletter. The previous record for the C class was also achieved by Simon McKeon with *Yellow Pages Endeavour* in 1993 at the same venue.

Macquarie Innovation was designed by Lindsay Cunningham and constructed in Melbourne, Australia. The team have been operating from Sandy Point, near Victoria's Wilson's Promontory, which they consider to be the best natural venue for speed sailing in the world.

The team claims the performance achieved by the boat represents not only the fastest speed ever recorded by a sailing boat, but also the most efficient use of wind energy by any craft competing for the World Sailing Speed Record, capable of sustaining speeds in excess of three times that of the wind powering it.

Background - In October 1993, the Australian *Yellow Pages Endeavour (YPE)* team achieved a new outright World Sailing Speed Record at 46.52 knots (86.52 km/h) over a 500m course in only 19 - 20 knots of wind. This record stood for over 11 years before finally being regained by a windsurfer. The initial design concept for *YPE* was brought to the team by its designer, Lindsay Cunningham. At the time, the team was between defences of the Little America's Cup in International C Class catamarans (the fastest course racing yachts in the world) and Lindsay's proposal sparked the interest in making an attempt at the World Sailing Speed Record. At the time, the World Record was held by a French sailboarder and Lindsay was confident that the new concept would be successful in taking out a new record.

After setting the World Record, the team decided to continue to push the limits of speed sailing. A new craft, *Macquarie Innovation*, was designed and built with the aim of being the first boat to break the 50 knot barrier.

***Macquarie Innovation* Team**

Based on the same concept as *YPE*, *Macquarie Innovation* is the culmination of all the design lessons learned from the earlier campaign as well as some new ideas. The total concept has been extensively tested both in computer simulations as well as in test facilities at the Australian Maritime College (AMC) in Tasmania.

Design

The design philosophy behind *YPE*, and now *Macquarie Innovation*, is based upon the previous world record holders, sailboards. The sailboards had been steadily increasing the world speed sailing record since the early 80's, however Lindsay was convinced that a new craft, also based on planing hulls, could go faster.

Rig design

Lindsay's assessment was that a solid aerofoil rig would be more efficient than a sailboard rig. The asymmetric single element rig of *YPE* was developed using the technology and design concepts from Lindsay's Little America's Cup catamarans. After the success of this concept, a solid asymmetric wing was also designed for *Macquarie Innovation*. It is here that the two boats differ most significantly. In order to increase the maximum available speed of *Macquarie Innovation*, more force was required out of the wing. This was achieved by altering the standard section profile and drastically reducing the aspect ratio of the rig compared to that on *YPE*. The rig is now has a span of approximately 7.5 m and chord of 3.4m.

While it was recognized that there would be a loss in efficiency from the low aspect ratio rig, this was easily compensated for by the reduction in overturning moment which would allow for significantly more sail force before the craft would tip over. This force in turn would drive the boat faster. As a comparison, computer simulations predicted that *YPE* had a maximum speed of around 49 knots in 19 knots of wind. In the same conditions, *Macquarie Innovation* was predicted to be capable of 58 knots.

The remainder of this article will appear in the next issue of the IHS Newsletter and will feature: Platform design, and Foil design.

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WELCOME NEW MEMBERS
(Continued From Page 2)

ron in Key West. After filling that position from 1980-1982, Chris became the squadron's Chief Staff Officer until 1984. Since retiring from the Navy in 1989, Chris has worked for the Florida Department of Environmental Protection as an Emergency Response Manager dealing with hazardous material emergencies and environmental crimes investigations.

William S. Stewart - Bill was in the Air Force from 9/46 to 9/49, and became a radar technician at Keio U. in Tokyo. After discharge, he entered Cal Tech to become an electronics engineer, but was soon recalled to active Air Force duty during the Korean War. On return home, he became a CPA, then later a management consultant, with Price Waterhouse & Co. in L.A., CA.

His first commercial experience with boats came when he met Ira Dowd. Ira informed him that he had the Island Transportation Co. which operated two passenger ferries from Newport Beach top Catalina Island. Suddenly, Bill was in the passenger boat business, responsible for all financial and permitting matters, and obtained the franchise to operate the *Magic Isle* from Long Beach to Catalina.

Then Helmut Kock (see article on page 8) came along and talked them into financing the addition of foils on an aluminum glass-bottom boat, *Discoverer*. It proved successful, so they rented a warehouse in Costa Mesa and began building the first Albatross hydrofoil.

The Hull of Albatross was then taken to Long beach for completion. Helmut and Bill took another test drive from Long Beach to San Diego before we added the windshield—a very wet ride in rough seas when she would crash due to a large following swell—the downfall of a fixed (surface-piercing) foil.

Bill and Ira Dowd made trips to the Coast Guard in Washington D.C. to gain approval of the Albatross to carry passengers for hire, the first in the U.S. They were successful subject only to actual sea trials in Long Beach with a capacity 30 persons, which was done with Ira Dowd, the press and several Coast Guard aboard.

CAPT. GORDAN EVANS VAN HOOK, USN (RET) - Gordan Van Hook is currently with Maersk Line, Limited as their Senior Director for Innovation and Concept Development, in their Arlington Virginia office. Recently retired from the US Navy after 29 years, Captain Van Hook is a third generation naval officer. After graduation with a Bachelor of Science degree from Texas A&M University, he joined the Navy and was commissioned through Navy Officer Candidate School in Newport, RI. In the Navy, Capt Van Hook had a broad and varied career, serving afloat in various destroyers and frigates. In his final job in the Navy he served as the Executive Director of the CNO Executive Panel, a group of 32 civilian leaders from government, industry and academia that provide pro bono advice to the CNO. Capt. Van Hook has a MS in Information Systems from the Naval Postgraduate School and an MA in National Security Strategy from the Naval War College. In his position with Maersk Line Limited, Capt Van Hook is focused upon ways that US maritime services can leverage commercial best practices and innovation.

IHS OFFICERS 2008 - 2009

John Meyer	President
Mark Bebar	Vice President
Frank Horn	Treasurer
Ken Spaulding	Secretary

NEW BENEFIT

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

IHS BOARD OF DIRECTORS

2006-2009	2007-2010	2008-2011
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Dennis Clark	John R. Meyer	Captain Frank Horn
William Hockberger	Joel Roberts	John Monk
George Jenkins	William White	Ken Spaulding

EXTRA FOR THE WEBSITE EDITION

HAYATE R/C MODEL TO RECEIVE THRUST REVERSER

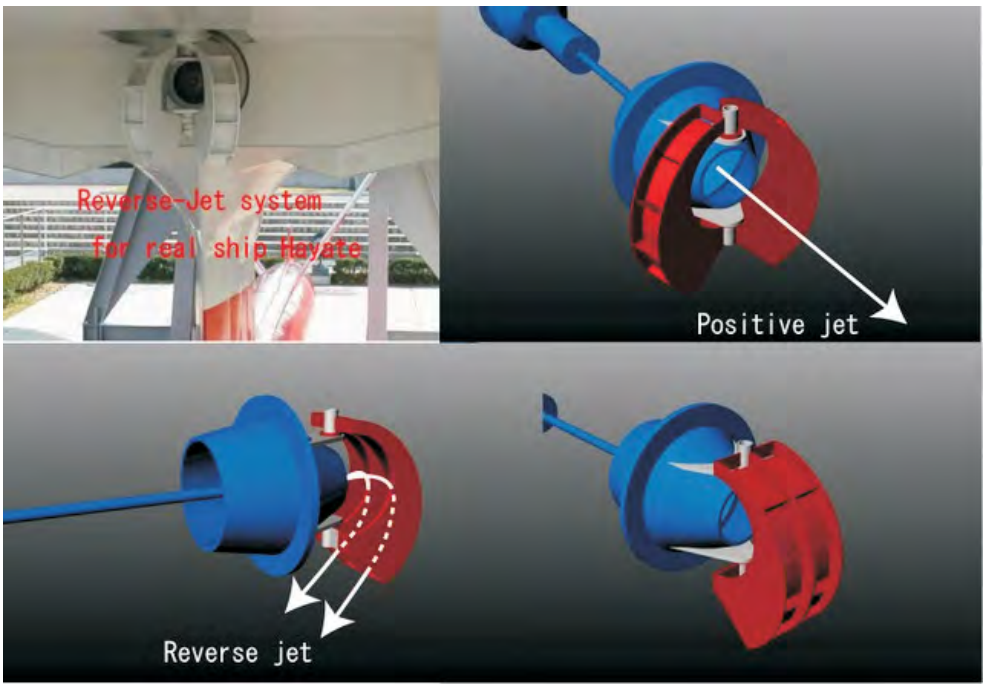
IHS continues via the BBS to follow Yoichi Takahashi's progress in constructing his radio controlled model of HAYATE. His progress was last reported in the 3rd quarter 2008 NL. As recently as New Year's Day 2009, it seemed that HAYATE was ready to launch. The R/C controller was installed, and painting was complete.

However, Yoichi had a brainstorm for ratcheting the accuracy and sophistication of his model up yet another big notch. He has now designed and will fabricate and install a split-style thrust reverser similar to that on the real HAYATE, which is on static display at the Kobe Maritime Museum. Yoichi used 3DCGDesign software to produce the views of the thurster shown on this page. He will continue to update his progress on the IHS BBS.

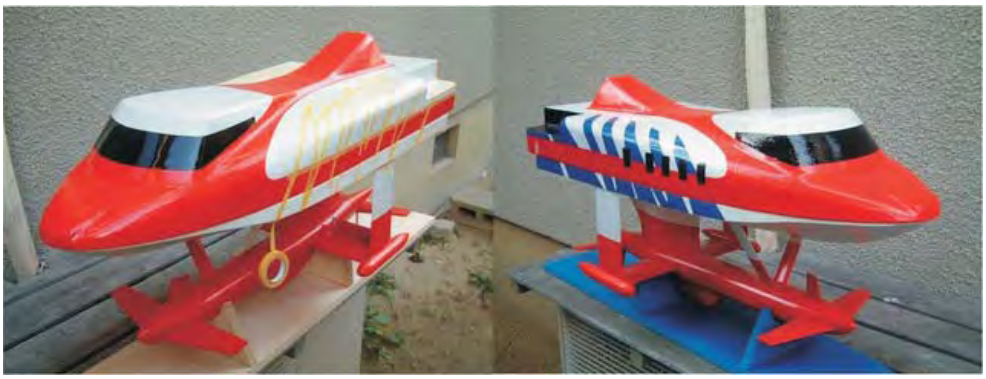
Former Navy personnel assigned to the PHM hydrofoil missile boat program will be interested to view Yoichi's impressive PHM model on video. To find these videos, just go to YouTube.com and search for "gasturvin."

IHS Bulletin Board (BBS)

The Newsletter comes out four times a year, but the IHS BBS is always "up" for news reporting, technical discussions, requests for help and more. The BBS is open to all. Just go to the IHS main page at www.foils.org and click the link to the BBS. Helpful hydrofoilers are encouraged visit the BBS regularly, review the latest postings, and share your news and knowledge. If you know the answer or can point to a person who does... please answer the posting accordingly.



Upper Left: The real HAYATE thrust reverser. 3-D concept views of the version to be installed on the R/C model



Above Left:paint job nearing completion; Above right: painting complete

Left: The real HAYATE on display at the Kobe Maritime Museum

The NEWSLETTER

International Hydrofoil Society

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

Editor: John R. Meyer | Third Quarter 2009 | Sailing Editor: Martin Grimm

ULTRA-LOW WAKE FERRY GETS GREEN LIGHT

All American Marine, Inc. (AAM) and Teknicraft Design, Ltd. have successfully made a proposal to Kitsap Transit to bring a new passenger ferry to Rich Passage. On Tuesday, April 21st, the commissioners of Kitsap Transit unanimously approved $5.3m for the purchase of a 77 ft ultra-low wake Teknicraft catamaran and on May 18th, All American Marine received the signed notice-to-proceed. The high speed passenger catamaran will carry 118 passengers and operate between Bremerton and Seattle, Washington at speeds of 29 to 38 knots.

Rendering of Foil Assisted Catamaran

The new vessel technology is the culmination of efforts having taken place over the past five years and the stakeholders involved span the globe. Kitsap Transit has been searching for an economically feasible solution to bring fast and environmentally safe passenger only ferry service back to the Kitsap Peninsula since Washington State Ferries was forced to terminate their service in 2003. Through a series of federally funded wake- wash studies, it became evident that the wake signature of a hydrofoil-assisted Teknicraft Design catamaran produced the least amount of wake wash energy within its tested vessel class.

See Low Wake Ferry, Page 3

SUSTAINING MEMBERS

YOUR 2009 IHS DUES ARE DUE

See Full Announcement on Page 2

INSIDE THIS ISSUE

PRESIDENT'S COLUMN

To All IHS Members

In my previous two columns, I pointed out the flurry of commercial hydrofoil activity Worldwide. Foil-assisted catamarans appear to be very attractive to the passenger fast ferry market. This is further shown by the lead article in this issue of the Newsletter in which Teknicraft's design is predicted to have low wake/wash characteristics for use on the Seattle to Bremerton route.

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 22 July. The presentation was "The Joint High Speed Vessel (JHSV) Program", by Major Christopher Frey, USMC, Strategic and Theater Sealift Program Office. Major Frey pointed out that he Joint High Speed Vessel (JHSV) Program is taking advantage of extensive commercial investment in high-speed vessel technology to develop an effective, affordable intra-theater military sealift capability. This ship will enable combatant commanders to transport 700 short tons of combat-ready units over a distance of 1200 nautical miles at 35 knots. On November 13, 2008 the Navy awarded a fixed price incentive contract to Austal USA for detail design and construction of the lead JHSV, plus nine JHSV options. It is anticipated that a copy of the presentation will be available on the IHS website.

YOUR 2009 DUES ARE DUE
IHS Membership options are: US$20 for 1 year, $38 for 2 years, and $54 for 3 years. Student membership is still only US$10. For payment of regular membership dues by credit card using PAYPAL, please go to the IHS Membership page at <http://www.Foils.org/member.htm> and follow the instructions.

Although the year 2009 started off with a flurry of new members; namely 10 in the first 4 months of the year, it has slowed down to a trickle. So all members are still asked to encourage colleagues to join.

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

At the last IHS Board of Directors meeting it was resolved to provide a brief synopsis of its activities in the quarterly issues of the IHS Newsletter. Please see the article entitled "From the Board Room" on page 4 for more details. I hope that most members will find these articles to be of interest.

As your Newsletter Editor, I continue my plea for volunteers to provide articles that may be of interest to our members and readers. Note that there are several articles in the current issue by our IHS members. Please send material to me (editor@foils.org).

John Meyer, President

WELCOME NEW MEMBERS

Dr. William C. Sandberg – Dr Sandberg is a Senior Scientist at the Science Applications International Corporation in McLean, VA and is an Affiliate Research Professor at the George Mason University.

Prior to joining SAIC last year, he was a Supervisory Research Physicist and the Deputy Director of the Laboratory for Computational Physics and Fluid Dynamics at the Naval Research Laboratory, from 1987-2008, where he was responsible for developing new algorithms utilizing the newest parallel computing architectures for a range of problems in computational physics and fluid dynamics.

Prior to joining NRL he had extensive experience, from 1968-87, in ship and submarine design as a Hydrodynamics Task Leader and also as the Head of the Hydromechanics Technology Branch in the Hull Form and Hydrodynamics Division of NAVSEA. Bill supported numerous ship and submarine designs during his career in NAVSEA and was very active in SNAME during the 80's when he chaired the Hydrodynamics Committee and also the Resistance and Flow Studies Panel.

He received a B.S. in Physics from Boston College, an M.Sc. in Naval Architecture from M.I.T., and a Ph.D. in Physics from Catholic University. His current areas of interest include the atomic and molecular dynamics of biological liquids for new nanosensors, nonlinear aerodynamics and hydrodynamics of flapping wing flight and pectoral fin swim-

Continued on Page 12

LOW WAKE FERRY
(Continued From Page 1)

Kitsap Transit contracted with Pacific International Engineering of Edmonds, WA to spearhead the ongoing research efforts in conjunction with All American Marine and Teknicraft Design to further enhance and optimize the vessel's design.

Teknicraft Design principal naval architect, Nic de Waal, of Auckland, New Zealand worked with hydrodynamicists from the University of Iowa's IIHR-Hydro- science and Engineering Research Center as well as naval architects from INSEAN in Rome, Italy to model an ultra-low wake hull. Coastal specialists from Golder Associates of Redmond, WA also evaluated the proposed vessel's performance in terms of wake generation and resistance. The vessel optimization study utilized Computational Fluid Dynamics (CFD) techniques to help refine the shape of the hull and hydrofoil to produce lower wake heights with less wake energy.

"Our hydrofoil supported hull has been developed and refined over the last decade to become a leader in catamaran technology," stated de Waal. "With the additional benefit of sophisticated and intensive CFD modeling over recent periods, we now have one of the most advanced and environmentally friendly hulls in terms of the combination of low wake, high speed, and low fuel consumption."

Beginning in June, AAM will construct the passenger ferry by combining an aluminum catamaran hull with a light weight composite cabin. Using composites will be a first for the company which has been building aluminum vessels for over 20 years. The latest composite technology will be used to create high strength structures at a lower weight than that of an aluminum equivalent. Composites also possess superior sound and insulation properties. AAM will outsource all composite components initially. In conjunction with Bellingham's Marine Innovation Zone program, AAM and Western Washington University will create the vessel's adjustable hydrofoil system using composites. JBE in Anacortes, Washington will provide composite panels to be bonded together to form the passenger cabin and pilot house.

All American Marine will fabricate the Teknicraft Design aluminum catamaran hull using 5383 Sealium aluminum alloy. Welded 5383 alloys are nearly 20% stronger than conventional marine grade aluminum with similar plate thickness. Using stronger aluminum will require less material to be used, thereby decreasing overall weight. Minimizing weight is a critical factor for controlling wake wash height and energy. The copyrighted hull design's premise is to create lift for the vessel by means of the hull shape and hydrofoil working together to displace nearly one-half of the vessel's weight. The net result is reduced resistance, reduced fuel consumption, reduced wake, and increased speed.

The vessel's purchase price is reflective of the state-of-the-art onboard technology, which will pay dividends in terms of providing an eco-friendly ferry service. Most noticeably, the hydrofoil system and wake mitigating interceptors will be adjustable and controlled by GPS, automatically making adjustments so the vessel will produce the lowest wake energy in the most sensitive coastal areas. The adjustable hydrofoil can also be manipulated intentionally to make minor adjustments to optimize speed without increasing engine rpm or fuel consumption. The adjustable foil is highly beneficial for commuter ferry applications where the passenger load may be heavier in one direction than the other.

Golder Associates will supply a specialized monitoring system for the hull and hydrofoil, providing detailed performance data for continued research purposes. Additional green features are included in the vessel's propulsion system consisting of four Caterpillar C18 ACERT engines, which will be fitted with specialized CleanAIR PERMIT™ filters to reduce harmful emissions by up to 99%.

Noise pollution will be mitigated with acoustic foam insulation and composite sandwich decking material. The cabin interior will be finished with recyclable aluminum honeycomb wall panels and recyclable aluminum ceiling panels with acoustic insulation. The finished vessel will be coated with a low VOC paint system. Other amenities include ADA-friendly heads, comfortable Beurteaux seating, and bicycle storage racks to encourage as many commuters as possible.

The new passenger ferry is scheduled to be completed and delivered by March 2010. Funding for the vessel construction, research, and initial demonstration run was in part secured through several federal grants and appropriations. Senator Patty Murray and Congressman Norm Dicks both

sponsored bills to fund the project and look forward to Washington setting a new standard for environmentally friendly passenger ferry service.

FROM THE BOARD ROOM

Every two months a meeting of the IHS Board of Directors is held at the Army-Navy Country Club in Arlington, VA, courtesy of George Jenkins. In order to keep our members better informed the Board has resolved to provide a brief synopsis of their activities in the quarterly issues of the IHS Newsletter.

L to R: J. Meyer, W. White, W. Hockberger, J. Monk, G. Jenkins, K. Spaulding, F. Horn, J. Billingsley Unable to Attend: S. Arima, M. Bebar, D. Clark, J. Roberts

The Board met on Friday, 29 May 2009. Most notable items at this meeting were the reporting of the results of the annual election of 1/3 of the Directors for a three-year term, and the subsequent annual election of IHS officers. The following Board members for the Class 2009-2012 were elected by the General Membership: Mark Bebar, Dennis Clark, Bill Hockberger and George Jenkins. The Board then re-elected current officers for a one-year term: President, John Meyer; Vice-President, Mark Bebar; Treasurer, Frank Horn, and Secretary, Ken Spaulding.

Current membership and financial status of IHS were reviewed. We are solvent and our membership and fiscal balances are stable. Sale of Compact Discs have increased over last year.

Highlights of advanced ship and craft activities in the industry worldwide were briefly reviewed with emphasis on the Littoral Combatant Ship (LCS) and foil assisted catamaran developments. This covers all AMV (advanced marine vehicle) types, not only hydrofoils, since they reflect the opportunities potentially open to hydrofoil employment. Moreover, their materials and subsystem technologies are basically the same.

Options for speaker at the July joint dinner meeting with the SNAME SD-5 Panel dinner meeting were discussed. These meetings have been well received and attended. Each meeting is reported in the following IHS Newsletter for those members unable to attend.

Usage of our website was reviewed. It was particularly interesting to note the international nature of site users. By continent, the usage was as follows: North America: 47%; Europe: 31%; Oceana/Australia: 6%; Asia: 4%; and Other (including unknown): 12%.

Most of the members are aware of our membership survey database. Readers are encouraged to utilize this source to locate members with like interests.

Status of our task with High Caliber Systems (HCS) to develop a historical hydrofoil video for the IHS website was discussed. Progress has been slow due to change of personnel at HCS.

RUSSIA'S GLASS BOTTOM BOAT

Diving gives amazing impressions, but requires special equipment, long training and ideal health of the diver. Submarines are great, but very expensive in use and it isn't good idea for people having claustrophobia. Ordinary glass bottom boats have narrow field of view, because their bottom glasses are flat and small. Besides, the speed of such boats is very low. Because ordinary glass bottom boats are slow, most of excursion time is taken on the way to and from underwater sightseeing. Also they have short range and often can't reach really interesting sites.

Hydrofoil *LOOKER* Underway

Because the *Looker* is a hydrofoil and has a good aerodynamic shape, she has a speed of from 20 to 40 knots at

Continued on Next Page

GLASS BOTTOM HYDROFOIL
(Continued From Previous Page)

the customer's option. Hydrofoils have exceptional seaworthiness in rough sea and give the highest level of comfort to passengers.

This Illustrates the Increased Bottom Viewing Area

The futuristic design of *Looker* attracts stares; these glass bottom boats are in the centre of attention in any beach and marina.

Looker boats have been already used and made profit to the owners all over the world. Customers include: United Arab Emirates, Maldives, Madagascar, Palau (Micronesia), Cabo San Lucas (Mexico), Barbados, Tortola (British Virgin Islands), Egypt, Saint Kitts and Nevis, Greece, and Canada.

ANNUAL HONG KONG-MACAU TRAFFIC EXCEEDS 18 MILLION PASSENGERS

From Fast Ferry International, April 2009

More than 18 million passengers traveled between Hong Kong and Macau in a single year for the first time in 2008. Figures released by the Hong Kong Marine Department reveal that the number exceeded 18.5 million. And if those traveling between Hong Kong Airport and Macau are included, the total exceeded 19 million passengers. Traffic on the two routes operated from Hong Kong's Macau and China ferry terminals increased by 10.1% compared with 2007, a year in which an increase of 17.5% was recorded.

The Hong Kong Marine Department issues separate statistics for passenger carryings on the two Hong Kong-Macau routes and Airport-Macau route but it combines figures for services operated from all three terminals, so direct comparison of vessel movements at the Macau and China terminals is not possible.

However, figures released by the Macau government indicate that approximately 69% of services were operated to or from the Hong Kong Macau terminal by either TurboJet or Cotai Jet, 25% were operated to or from the Hong Kong China terminal by New World First Ferry and 5% were operated to or from Hong Kong Airport by TurboJet.

Although New World First Ferry increased frequencies in 2008 and TurboJet operated more Airport-Macau services, the vast majority of an 11.3% increase in services were operated between the Hong Kong Macau terminal and Macau. The principle reason was the appearance of a new operator, Cotai Jet, in January 2008. Even this does not fully explain the 28.8% increase in the number of services operated by catamarans during the year though. A clue to another contributory factor is given by the 12.1% reduction in number of Jetfoil services operated, TurboJet obviously allocated catamarans to more of its services in 2008.

The load factors achieved by the 240 seat Jetfoils continued to be impressive however. The average load factors of 73.6% on services to Macau and 75.2% on those from Macau were only 3.0% and 2.7% lower than the figures for 2007.

Load factors on the 300-420 seat catamarans in 2008, were 48.8% on services to Macau and 58.9% on services from Macau, were 6.3% and 10.0% lower than in 2007.

Quarterly Statistics

The increase in catamaran services operated during 2008 as Cotai Jet progressively introduced a fleet of ten Austal 48m vessels between January and October is illustrated in the quarterly statistics issued by the Hong Kong Marine Department.

These show a staggering increase in catamaran services of 44.4% in the third quarter and 48.3% in the fourth quarter compared with the corresponding figures for 2007. There were falls in the number of Jetfoil services operated of 16.3% and 20.6%. As the number of catamaran services increased, so did passenger carryings but average load factors fell on both catamarans and Jetfoils.

Referring to its first year of operation, Cotai Jet has revealed that it carried 3.4 million passengers. The company estimates that 70% of its traffic was generated by the opening of new hotels and casinos on Macau's Cotai Strip and the remaining 30% would previously have traveled with TurboJet or New World First Ferry.

TurboJet

A Shun Tak review of the performance of its TurboJet division in 2008 issued earlier is relatively downbeat. The company reports, "As a result of rising global oil prices, the

Continued on Next Page

HONG KONG-MACAU TRAFFIC
(Continued From Previous Page)

fuel costs of the Group's shipping operation surged year-on-year by approximately 42%, causing the division to record an operating loss of HK$150 million for 2008, as compared with an operating profit of HK$259 million for 2007.

"Turbojet Airport routes continue to exhibit strong growth, registering a 32% year-on-year increase in passenger volume. To cope with increasing demand and offer better connectivity with flight schedules, a 21% additional capacity has been introduced.

"The Group continues to be committed to expanding its inter-modal transportation platform, and is planning to launch a new service between Nan Sha and Hong Kong International Airport, with the application pending for approval."

WATERJETS GET EFFICIENCY BOOST

Extracted From Passenger Ship Technology, April/May 2009

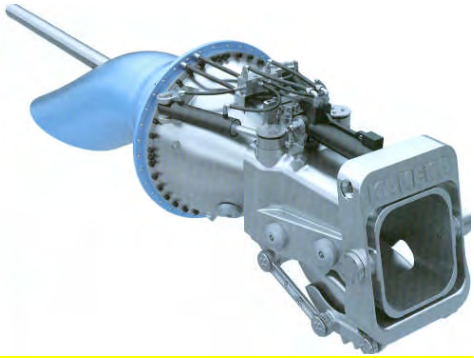
by Doug Woodyard

One of the most significant waterjet technology developments in the past year has been the introduction by Rolls-Royce of its new stainless steel S3 series of waterjets. These are both more compact and lighter than previous generation units and are also said to offer significant savings in life-cycle costs. In addition, the company's smaller aluminium A-series of waterjet has benefited from a major redesign intended to achieve significant efficiency gains, while further new products are lined up for launch over coming months.

Service experience from the successful Kamewa SII series was combined with advanced design techniques to create the more compact S3 waterjet, which, Rolls-Royce claims, offers a 25 per cent reduction in weight, as well as a 12 per cent smaller transom flange diameter.

For most applications, an S3 model one size smaller than its predecessor in the SII program will reportedly yield the same performance.

Alternatively, retaining the same diameter of waterjet as before delivers a higher maximum speed or facilitates a larger payload at the same original speed. Another option open to users as a result of the new waterjet series is a reduction in installed power and lower fuel consumption at the original speed.



The Kamewa S3 Series Waterjet from Rolls-Royce

At the heart of the S3 waterjet is a mixed flow pump, located aft of the transom flange, the impeller of which represents a significant improvement on the SII component. In particular, Rolls-Royce points out that the cavitation margin has benefited from the employment of advanced CFD techniques, combined with extensive tunnel testing at the Rolls-Royce Hydrodynamics Research Centre.

A lengthy research and development process has allowed Rolls-Royce to optimise the performance of the complete pump unit and inlet duct to claim a gain in propulsive efficiency of 2 to 3 per cent over the SII series.

Kamewa S3 waterjets can be supplied as steering and reversing units or as boosters with a fixed jet nozzle giving ahead thrust only, and systems can be configured for multi-jet installations or combinations of waterjets and CP propellers. Rolls-Royce plans to introduce progressively a range of frame sizes, with pump diameters extending from 50cm to 2m and power ratings ranging from around 2,100kW for the smallest S3-50 model up to 41MW for the largest S3-200 model. This is currently the maximum rating for high speed vessel propulsion.

Rolls-Royce has also undertaken a major redesign of the A-series and this has resulted in the introduction of the 56A3 waterjet which incorporates the same mixed-flow pump technology as the S3 series. The new pump unit, which has all components in stainless steel, is said to offer an increase in propulsive efficiency of 2 to 3 per cent, or a rise of around 1 knot in speed from the same power input in a typical application.

The 56A3 series waterjets can be supplied with the Rolls-Royce interceptor trim system which bolts directly to the waterjet, thereby facilitating retrofit work. The waterjets and interceptors work together, the jets providing steering while the interceptors control the vessel's trim and roll angle in turning, maximising the overall hydrodynamic efficiency.

Continued on Next Page

WATERJETS GET EFFICIENCY BOOST *(Continued From Previous Page)*

An input power range up to around 2,200kW is covered by the 56A3 model. Other A3 sizes will be introduced over the coming months to cover the power ranges of the existing A-28, 32, 36, 40, 45 and 50 models.

Fast ferries ordered by Norwegian operator Fjord 1 will be the first passenger vessels to be driven by the 56A3 waterjets. These vessels are currently under construction at the domestic yard, Brodrene Aa.

Rolls-Royce is also working on some interesting new developments. Its FF range caters for lower power applications and a new FF67 model, which will be ready for the market in late 2009, will be the most powerful in this particular range. While mainly targeting naval applications, the aluminum design is also said to be suitable for fast ferries.

Rolls-Royce waterjets will power a fleet of new water taxis being introduced in Dubai by the Road Transport Authority (RTA), to help alleviate transport congestion. The first of ten catamaran-based vessels being built by Damen in the Netherlands is scheduled to carry out sea trials in August 2009, and delivery of these vessels is due to be completed by early 2010.

Each water taxi, capable of more than 30 knots and able to carry 11 passengers, will be equipped with a pair of FF310 waterjets built by Rolls-Royce in Kokkola, Finland. According to Esa Uotinen, Rolls-Royce regional manager, marine, "Waterjets are ideal for these taxis because they are a practical way of driving fast vessels and are most efficient at speeds of around 30 knots and upwards. They are light in weight, simple to maintain and provide excellent manoeuvrability."

Rolls-Royce has achieved considerable success delivering waterjets for naval applications in the Middle East, including a number of vessels on order at Abu Dhabi Ship Building (ADSB), but this represents a breakthrough in the regional passenger ship sector. Rolls-Royce Kamewa waterjets in service in the Arabian Gulf region will, following an agreement signed in August 2008, be maintained at a new Waterjet Service Centre being established with ADSB and which is due to be completed later this year."

THE "USHUAIA METEOR"

By Martinn Mandles, IHS Member

I very much enjoyed word and pictures that described some highly modified (to say the least) Russian Meteors in the Second Quarter 2009 issue of the IHS Newsletter.

Here is a photo of another one I took dockside in Ushuaia, Argentina ("the southernmost city in the world") while my wife and I were waiting to board our small cruise ship — but certainly NOT this Meteor, or ANY Meteor — for an expedition across the Drake Channel, and then down the East Antarctic Peninsula until we were icebound in the Weddell Sea!

The hull of this particular Meteor appears to be resting in a hammock between two catamaran hulls that were NOT at all foil-assisted. Having hydrofoiled on REAL Meteors above the Volga River in Moscow, the Dnieper River in Kiev, and the Neva River in St. Petersburg, we turned down a ride at sea level aboard the "Ushuaia Meteor."

BIRTH OF THE ALBATROSS - AMERICAS FIRST HYDROFOIL CERTIFIED TO CARRY PASSENGERS FOR HIRE

By William S. Stewart, IHS Member

I much appreciate the historical work the IHS has done on hydrofoil boats. I think it is an important part of American history, and I hope IHS can keep it alive. I'd be happy to contribute all my many articles, publications and other things I have collected if you have a use for them.

Bill Stewart

I learned of the IHS great web site just recently when I was told about it by Steve Dowd, Ira Dowd's son in Newport Beach, CA. On the site, I found lots about Helmut, but nothing about Ira E. Dowd except two references in listed periodicals. I'm a little surprised that Helmut didn't give Ira **all** the credit

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

(Continued From Previous Page)

Ira Dowd

for the development of his hydrofoil here in Newport Beach by HYDRO-CAPITAL of which Ira was the Chief Executive, and I was Treasurer. Ira and I ran the company that had a subsidiary, Island Transportation Company that operated two passenger ferries to Catalina Island, 26 miles off the coast of Newport Beach, CA.

Helmut Kock

One day, in mid-1961, Helmut Kock walked into our offices with a roll of plans under his arm and stated that what we needed was a hydrofoil boat to cut the transit time to Catalina in half, and he could build one. Helmut said that the plans were of a German hydrofoil fleet, all of which the Nazis had scuttled when they saw they were going to lose the war. The plans, he said, were smuggled out of Germany to an agency in Chile which dealt in spy-collected material for sale to the highest bidder. Helmut said that because of his work in the German shipyards before the war, he was interested in the hydrofoil plans and made a copy for himself, which he brought to us. Ira and I liked the idea and made a deal with Helmut to buy a lightweight aluminum glass bottom boat, *Discoverer*, that was being used in the tourist business in La Jolla near San Diego CA. We bought the boat and set up Helmut in a small Tod Shaffer Shipyard in San Diego to put foils on her. When it was finished, we all went to San Diego for the launching. The shipyard owner refused to launch until the job was paid in full, in case it didn't work, so we were delayed until I could get a wire transfer made. While we waited, the photo was taken of Helmut and me in front of Discoverer which is shown on the IHS website as a photo of the three of *Discoverer*. Luckily, for all, the *Discoverer* flew beautifully, and we took it to Newport Beach to make plans for a production model that became the *Albatross*. I and our bank President and Loan Officer at Union Bank were scuba divers, so we put the Glass Bottom Discoverer to much use taking us to Catalina and other places to scuba dive. The bankers were sufficiently impressed with the performance of *Discoverer*, that they lent us the money to build the *Albatross* in Costa Mesa, near our Newport Beach Offices.

As we ran into foil production problems, Ira found another important man in William R. Batley, Jr. of Brawley, CA who helped us develop the extrusion process and the welding techniques for the foils. Bill Batley is in his 80s and doing very well and lives near San Diego now. He and I have remained close friends and occasional business associates since I first met him on the Albatross project. Bill Batley and I also participated in the rescue of FDR's presidential yacht which laid derelict on the bottom of the Bridgetown, Barbados careenage. That's where I was when the *Albatross* patents were sold to Wilson, but that is a whole other story. The Potomac is now fully restored as when FDR sailed on her. She is operated by the Port of Oakland, CA as a tourist attraction.

***ALBATROSS* On Trial**

The Hull of *Albatross* was built in Costa Mesa, then taken to Long beach for completion. The photo is of an early test of the foils with me driving, Ira Dowd standing next to me and Helmut sitting at the stern. Helmut and I took another test drive from Long Beach to San Diego before we added the windshield—a very wet ride in rough seas when she would crash due to a large following swell—the downfall of a surface-piercing foil craft.

Ira Dowd and I made trips to the Coast Guard in Washington D.C. to gain approval of the *Albatross* to carry passengers for hire - the first in the U.S. We were successful subject only to actual sea trials in Long Beach with a capacity 30 persons on board which was done with Ira Dowd, the press and several Coast Guard aboard. They tried every maneuver to swamp the *Albatross* in 10-foot seas, but the flared foil tips, which give greater lift, prevented her from rolling over.

On completion of the *Albatross*, we tried her from Newport Beach to Catalina Island and back. Going over was great, but returning with a following sea caused many uncomfortable crashes. This could only be avoided by taking across the swells so as not to raise the stern so high as

Continued on Next Page

BIRTH OF THE ALBATROSS
(Continued From Previous Page)

to plow downward off the foils. We had to rule out that passenger route, and instead, used her along the lee coast of Catalina Island quite successfully.

We decided the only practical use for a surface-piercing foil craft was in the still waters of the east coast harbors and inland waterways. So, we sold the patent rights to Wilson Shipyard of Wilmington, DE. When Wilson determined that they couldn't build the boat, Ira Dowd went east and moved the production to the Ludwig Honold Manufacturing Co. in Folcroft, PA where the remainder of the Albatross class boats were built. Ira Dowd then set up the passenger business from Manhattan to the 1964 New York World Fair, with 14 *Albatross* class boats logging over 50,000 passenger miles that summer.

When the World Fair was over, Ira Dowd used some of the same boats in a hydrofoil commuter business to and from Manhattan in the name of American Hydrofoils Inc. of which he was President. That operation gained nationwide publicity when, on their first run, Ira rescued movie producer Samuel Goldwin, his wife and investment banker Robert Lehman from Lehman's disabled yacht in the Hudson. That event gained 6 pages in the July 26, 1963, issue of Life Magazine, the last page of which shows Ira coming up out of the water after falling overboard while talking to the Coast Guard about the incident. That high-end commuter service came to an end due to lack of financing.

Ira and Helmut went on to promote the use of Russian hydrofoils in Canada and the West Indies before returning home to California.

In my opinion, Ira E. Dowd was the most successful promoter of Hydrofoil use in the United States. I was his Chief Financial Officer until he left California for the east coast, I opted to stay behind and get married, but Ira kept me informed of all his and Helmut's progress in the hydrofoil industry. Helmut the designer, and Ira the promoter, are truly the backbone of the hydrofoil industry in America.

NAIAD ACQUIRES VT MOTION CONTROL GROUP

USA Naiad Maritime Group, Inc. and VT Group plc (VT) announced Naiad Maritime Group's completion of the acquisition of the collection of businesses known as the VT Motion Control Group, including Naiad Marine Systems, Maritime Dynamics, Vosper Motion Control and Vosper Stabilizers. The acquisition was led by John Venables, former Group President of the VT Motion Control businesses, with 27 years in various engineering and executive capacities at the companies.

Venables will continue to lead the business as President & CEO of Naiad Maritime Group. Naiad Maritime Group, Inc. is comprised of Naiad Dynamics US, Inc., Naiad Dynamics UK, Limited, and Naiad Dynamics Holland, BV. It has operations in Connecticut, Maryland, Florida, and Washington, the Netherlands, United Kingdom, and Australia.

The sale is in accordance with VT's strategy to grow its service-related business. Some 80 percent of VT's turnover is now generated by its service-related business and the Group has announced its intention to sell its stake in the shipbuilding and naval support joint venture, BVT Surface Fleet, later this year.

NAIAD dynamics will continue to serve each of these marine sectors, and plans to expand. In addition to specializing in Underway and At Rest (zero speed) Stabilization and Ride Control solutions for displacement and planning monohulls, the company will continue to apply its expertise to supply Ride Control Systems for virtually all types of advanced hull forms including Catamarans, Trimarans, SWATH vessels, SLICE vessels, Submerged Foil vessels, Air Cushion vessels, and Surface Effect Ships (SES).

A sample of recent applications of the company's Stabilization and Ride Control Systems includes:

- United States Navy 115m USS Freedom, Littoral Combat Ship, Ride Control System
- Royal Navy of Oman 100m Ocean Patrol Vessels (qty 3), Active Fin Stabilizers
- Trinidad & Tobago Coast Guard 90m Offshore Patrol Vessels (qty 3), Active Fin Stabilizers
- Heesen Yachts 50m motoryacht Man of Steel, Active Fin Stabilizers with Stabilization at Anchor (zero speed) capability.

SAILOR'S PAGE

MACQUARIE INNOVATION ACHIEVES 50 KNOTS PLUS OVER 500M

This is the second half of the article appearing on the SAILORS PAGE in the Second Quarter 2009 NL.

Platform design

The evolution of the *YPE* platform began by ensuring that a significant righting moment was available to counteract the heeling moment from the sail force. This was achieved by placing the two crewmen in a streamlined pod more than 10 metres to windward of the sail.

Another view of *Macquarie Innovation* Speed Sailing at Sandy Point on 26 March 2009. Photo by Steb Fisher

To complement this massive righting moment, good fore and aft stability was also required. In order to reduce windage and water drag, this fore and aft stability was achieved by setting two relatively short planing surfaces approximately 11 metres apart. The angle of the crew pod support beam was set to balance the relative amounts of downforce on the fore and aft hulls.

The hull sizes for *YPE* were governed by the need to ensure adequate buoyancy during the displacement phase while the width of the planing surface (1.2m) was set to ensure the most efficient planing aspect ratio possible.

Macquarie Innovation was designed around the same principles as *YPE*. However, to go faster meant a wider and stronger platform was required to handle the increase in performance from the new wing.

The load bearing components are constructed using high modulus pre-preg unidirectional carbon fibre and NOMEX® cores. The crew pod is constructed using lightweight marine plywood. This is one of the safety features built into the design. In the event of an accident, it was decided that it was safer to have the crew thrown clear of the wreckage with minimal impedance to their path out of the craft. The other option of the 'safety cell' was considered to be too heavy and cumbersome to be seriously considered.

All aerofoil fairings are constructed using foam and heat shrink cloth. This allows a very lightweight total structure. The total weight of *Macquarie Innovation* is slightly in excess of 200 kilograms.

Foil design

The foils that control *Macquarie Innovation* and provide the hydrodynamic side force to counteract the sail force are tiny by comparison to the large overall dimensions of the craft. They are asymmetric in profile with a total span of approx 270mm. At various stages of development of the craft, the trailing edge of each of the two planning hulls has been fitted with either three or four such foils.

Macquarie Innovation Supported on Cradles While out of the Water. This Shows the Positioning of the Foils on each of the Pair of Planning Pontoon. Photo via Macquarie Speed Sailing Team.

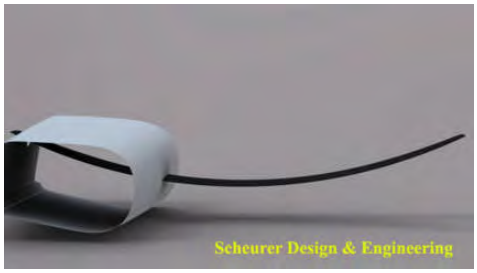
The foils have been tested using both computer simulation as well as flow tank testing at the Australian Maritime College facilities in Tasmania. With such high design speeds and relatively large loads carried by the foils (each of the foils experiences the equivalent of an average adult male standing on the end of them), the possibility of experiencing cavitation is real. The section profile is designed to delay the onset of cavitation, thereby ensuring that control is maintained with minimum drag. Two anti-ventilation "fences" are also fitted on each foil to prevent the low pressure developed on the foils from dragging air down from the surface.

This article was prepared based on material generously provided by the Macquarie Speed Sailing Team, including extracts from their website.

CURVED DAGGERBOARDS FOR A-CLASS CATAMARANS

Contributed by David A. Carlson (IHS Member)

In November last year, Dave Carlson sent your editor a message and image reporting on European development of curved dagger- boards for competition A-class racing catamarans, rather than the conventional straight daggerboards.



Curved Daggerboard Illustrated on a Section of A-class Catamaran Hull. The Daggerboard Curves Inwards Towards the Centerline of the Boat.

The box rule for the A-class is "open", essentially defining a maximum sail area, weight, length and beam, however there are also constraints on the arrangement of the daggerboards including a stifling U.S. requirement that "Hydrofoils are not permitted" (though it is not clearly defined what is meant by "hydrofoils"). For more details, the April 2007 issue of these rules is available at:
http:/www.a-cat.org.au/PDFs4download/ISAF%20INTERNATIONAL%20A%20CLASS%20RULES.pdf

Dave has noted that A-class catamaran designers had previously experimented with straight dagger boards initially canted outwards for better efficiency to weather, then canted inwards on more recent designs, to allow "partial hydrofoiling". David also reported that at present, the US interpretation of the rules does not permit "hydrofoiling" to the extent that the daggerboard could lift the hull clear of the water however it does appear to allow "lifting a bit" due to any upthrust generated by inclined daggerboards.
Dave feels that in the USA there is concern that if true hydrofoiling were to be permitted then the existing A-class fleet would become obsolete, just as happened with the International Moths when hydrofoils were permitted on that class. However, development marched onward anyway.

Upon examination, the curved daggerboards developed by Scheurer Design and Engineering are designed to just fit within the rules which constrain maximum craft beam to no more than 2.3m (7.5ft) and require a minimum separation between underwater appendages (daggerboards) of at least 1.5m. Their design allows them to be in any retracted position and still meet these rules. However given that the hulls would be about 0.25m beam each, and since the daggerboards emerge from the centreline of the hull, the maximum horizontal projected span of these curved daggerboard is limited to only around 0.275m. With the catamaran in an upright position, the upthrust would therefore be only of the order of 6% of total normal force on the daggerboard. However clearly, as the craft heels significantly in higher wind speeds, the curved daggerboard will have a more marked potential to produce worthwhile upthrust thus lifting the downwind hull to reduce its drag. Herein lies the crux of the matter!

In feedback to David, Tom Speer has also noted a further potential attraction of using curved foils in that this configuration still allows the skipper to vary the foil area according to the conditions. When the dagger boards are half-retracted, they remain efficient for side force generation without the wetted area penalty of any horizontal daggerboard portion in conditions when the boat would in any case be unable to fly.

Intergalactics and Midwinter Championships, Islamorada, Jan. 2009, Florida Keys & Uni-rig A-C class North American Championships, Fort Walton Beach, Florida, update by David A. Carlson, May 2009

I recently participated in three events that included uni-rig modern A-cats which are high performance catamarans that weigh 165 pounds (75 kg) all up, are 18 feet long, and almost totally carbon fiber. Three of these were Marstroms with curved asymmetric foils. Goran Marstrom brought these to Islamorada in the Florida Keys for two multi-day January events, the Intergalactics followed immediately by the Midwinter Championships. Goran sailed one, and finished generally in the upper middle of the fleet in lighter air, where I saw him sailing downwind with both boards up. However, on the second day there was a fresh breeze, and Goran took two second places against top competition. John Schiefer sailed another, and said that the curved boards gave the boat a "much lighter feel and seemed to come alive". On my first inspection, these boards were seen to have asymmetric profiles, so there is an apparent lifting capability, particularly when heeled over.

[Editor's Note: The remainder of this article will appear in the next NL.]

WELCOME NEW MEMBERS
(Continued From Page 2)

ming, the design of novel unmanned air and underwater vehicles, and the unsteady hydrodynamics and aerodynamics of submarine and ship flows.

William S. Stewart - Bill was in the Air Force from September 1946 to September 1949, becoming a radar technician at Keio U. in Tokyo, Japan. He went over by troop ship to Okinawa and Manila, and returned home by troop ship from Guam. After discharge, he entered Cal Tech to become an electronics engineer, but was soon recalled to active Air Force duty during the Korean War, spending all his overseas time in Casablanca, Morocco.

On return home, he received an accounting education and became a CPA, then later a management consultant, with Price Waterhouse & Co. in L.A., CA. As a hospital business expert, he was sent to Newport Beach, CA to fix some problems at Hoag Hospital there. Living on Newport Harbor, he bought a Lehman 14' sail boat, and developed a love for the sea crewing in races on Stars, Rhodes, other sloops, and a schooner, and was in several Ensenada races. See article about *ALBATROSS* on page 7 for additional information about Bill Stewart.

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FOILJET MR1 HYDROFOIL: THE MOTOCROSS BIKE FOR WATER

[Ed Note: Barney Black, IHS Life Member, found this internet item that we both thought would interest our readers.]

The Foiljet MR1 is a new personal watercraft concept that takes the best features of a motocross bike and jetski, throws in two hydrofoils plus a silent, energy efficient electric motor to create what would have to be a surefire recipe for outrageous fun. The design looks something like a motocross bike, but instead of wheels there are beams (struts) with small hydrofoils mounted at the ends that can be raised or lowered. The concept would use a 15 kW (20 hp) electric motor housed at the end of the rear beam with its instant electric torque lifting the craft out of the water to become "foil borne".

Foiljet MR1 Concept

To cope with shallow water the beams can be raised at the flick of a switch. The electric motor runs off a 48V battery that should see three hours of full load running with theoretically a 10 min recharge time.

Matt De Bellefeuille & Robert Vandenham have come up with an original concept design that most definitely deserves to reach the prototype stage.

The designers have selected a T-shaped fully submerged foil system which, while not affected by surface waves is not self stabilizing, so it needs constant adjustment of the angle of attack of the front foil to keep the craft level with the surface. Front foil angle adjustment on the Foiljet MR1 is made manually by what would conventionally be the clutch lever on a motorcycle. In larger applications this sea-keeping function is automated with a computer system that measure either surface height or pitch and roll to make constant fine adjustments to the front foil.

Hydrofoils produce relatively no wake and electric propulsion is near silent, so if the Foiljet MR1 makes it into production it may allow current laws against jetski's on inland water ways to be relaxed around residential areas.

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The NEWS LETTER

International Hydrofoil Society

PO Box 51 - Cabin John MD 20818 - USA

Editor: John Meyer | Fourth Quarter 2009 | Sailing Editor: Martin Grimm

IF WE HAD PHMS TODAY.....

By Captain Frank Horn, USN (Ret); IHS Member

At the IHS 25th Anniversary Celebration and Conference, held on June 14, 1995, Admiral Zumwalt presented the keynote address.

In part, he said: "With regard to the hydrofoil program, the original plan was to procure 35 PHMs.....only six were built in the formal program. Our concept was to achieve a small, high performance, small radar cross-section, high-speed, all-weather capability with sufficient armament to deal with likely threats. Our planned use was to achieve presence in the smaller seas, i.e., Adriatic, Aegean, Gulf of Sidra, Red Sea, Persian Gulf, Arabian Sea, Pacific Rim areas, the Baltic and Black Sea. This would permit our larger ships to avoid risk by laying back until coming in for wartime operations at the ready. It was capability that would have been particularly useful against regional threats. The PHM was born in 1970 and died in 1992.

PHM-3 Operating in the Caribbean in the 1980s

The future threats that we face are many fold; the PRC, Bosnian-type operations, North Korea, Syria, Libya, Iraq, and Iran as the center of a bloc of fundamentalist religiously fanatic nations. Readiness to deal with these threats makes hydrofoil craft of modern

See PHMS TODAY, Page 3

SUSTAINING MEMBERS

YOUR 2010 IHS DUES ARE DUE

See Full Announcement on Page 2

INSIDE THIS ISSUE

PRESIDENT'S COLUMN

To All IHS Members

We are pleased to announce that the IHS Board of Directors has selected Alain Thebault for an award of Honorary Life Member of the Society. Please see a copy of the award citation on page 9. Also Martin Grimm has provided an excellent article on the record breaking hydrofoil sailboat, l'Hydroptere. Alain Thebault and his team achieved an outright world speed sailing record of 51.36 knots over a 500 meter run; see page 10.

IHS has been invited to set up a booth/table at the ASNE High Performance Marine Vehicles Symposium, 9-10 November 2009 at the Maritime Institute of Technology & Graduate Studies (MITAGS) Linthicum, MD (Baltimore / Washington Corridor). The table will be manned by Frank Horn, John Monk, and Dennis Clark. All members who may be attending the symposium, please stop by the booth.

I was pleased to have Captain Frank Horn write an article for the current Newsletter featured on the first page. I hope that you will find it interesting and informative. I can think of no one more qualified to write about the PHMS.

Although the year 2009 started off with a flurry of new members; namely 10 in the first 4 months of the year, it has slowed down to a trickle. So all members are still 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). Please check the information on the List. If it is incorrect, please send changes to: Steve Chorney: schorney @comcast.net

YOUR 2010 DUES ARE DUE
IHS Membership options are: US$20 for 1 year, $38 for 2 years, and $54 for 3 years. Student membership is still only US$10. For payment of regular membership dues by credit card using PAYPAL, please go to the IHS Membership page at <http://www.Foils.org/member.htm> and follow the instructions.

During this past several Quarters, High Caliber Solutions (HCS) has re-started work on putting together an IHS Video, called "Hydrofoil World". HCS has made rapid progress recently, and after some last minute additions and changes, "Hydrofoil World" should be ready to view from the IHS website. I will keep you informed.

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. Note that there are several articles in the current issue by our IHS members. Please send material to me (jr8meyer@comcast.net).

John Meyer, President

WELCOME NEW MEMBERS

PETRI FLANDER –

Petri is a Mechanical Engineering/Aircraft design student in his third year at Helsinki Polytechnic. He is also studying Mechanical Engineering, and Machine Design. He hopes to obtain a position in Aerospace or Marine Engineering. Petri is interested in recreational foil-assisted multi- hulls, like CATRI concept by Aldis Eglajs. Also, he feels that foil-assisted, "cruiser-racer" power multi-hulls seem to have some very interesting possibilities.

CAPT. ROBERT W. KESTELOOT, USN (RET) –

Bob Kesteloot is President and owner of a consulting company dealing in a wide range of maritime matters, but especially in the shifting of ground transportation from congested highways, e.g. I-95, to the nation's Marine Highways, e.g., W-95 which runs from Norfolk/Hampton Roads, up the Chesapeake Bay to Baltimore.

Bob is a 1956 graduate of the University of Notre Dame and quickly signed on with the Navy, his choice of draft evasion, and was commissioned as an Ensign in December, 1956. His sea assignments were in four different destroyers, a Destroyer Flotilla Staff and command of a 4,000 ton Frigate. An earlier sea command was an Auxiliary Ocean tug and salvage ship as a Lieutenant.

Shore assignments included Briefing Officer for the Chief of Naval

Continued on Page 12

PHMS TODAY.....
(Continued From Page 1)

design ideal as the low end of a modern high-low mix.

The commercial development of high-speed craft is serving to reduce the costs of military craft. In this day of threats, we would be much better off if we had PHMS in our force. I give tribute to the progenitors of the hydrofoil and other fast combat craft and urge you all to hang in there."

Since 1995, when Admiral Zumwalt made these remarks, "readiness to deal with these threats makes hydrofoil craft of modern design ideal as the low end of a modern high-low mix", seems even more appropriate today. This becomes even more evident in view of the advancements that have been made in a variety of technical areas such as control systems, navigational equipment, propulsion systems, structural analysis, materials (including composites) and manufacturing capabilities. Application of this array of technology would result in an even more capable PHM in terms of greater range and higher payloads resulting in enhanced mission capabilities.

For instance, recent events in the Arabian Sea have made it apparent that a high speed, high sea state capable ship would be particularly useful against the PIRATE threats plaguing the region. Their usefulness to the Task Force already deployed in the area seems self-evident. In addition US Navy ships have been threatened by 50-foot gun boats. PHMS could provide protection or escort duty to keep our large ships out of harms way. Admiral Zumwalt's list of likely threats may need to be enlarged to include those areas of political unrest in South America and the Caribbean. PHMS could provide that presence.

It would be very fruitful for the Navy to have industry take a look at what an improved "PHM" would look like in light of current technology. An example of this could be a Bi-Foil arrangement with propeller propulsion, or a hybrid hullform such as the Hydrofoil Small Waterplane Area Ship (HYSWAS) concept, similar to that explored in the 1990s shown here. Reference: "Hybrid Hydrofoil – A Concept Whose Time Has Come", by John R. Meyer, Jr. presented at the Intersociety Advanced Marine Vehicles Conference, Washington, D.C., June 1989.

A Hybrid Hydrofoil Concept Version of PHM

The HYBRID HYDROFOIL concept described in the above paper builds upon the PHM experience. The concept's features provide greater flexibility not only for the designer, but more importantly, the operator.

Modifications of the PHMS foil and propulsion systems result in improved hydrodynamic and propulsive efficiencies, and in addition, result in an extremely low wake signature in the foilborne mode.

For example, Anti-Surface Warfare could be enhanced considerably by a HYBRID HYDROFOIL with greater range, endurance and military payload. This would allow the ships to deploy for longer periods before returning to base, and at the same time, more effectively utilize their high-speed capabilities.

Range improvement of the HYBRID HYDROFOIL would provide the capability for world-wide deployment without the necessity of being towed or refueled from other ships. Also, when operating with the Fleet, dependence on support ships for fuel would be stretched by a factor of about three. During independent operations, one HYBRID HYDROFOIL could act as tanker for other conventional patrol craft, thereby giving all craft in the group considerably more range and staying power.

A HYBRID HYDROFOIL would have the option to trade off some of the relatively large fuel load for additional weapons and combat equip-

Continued on Page 12

IMPROVED DESIGN FOR SEAKEEPING: SPECIFICATION ORIENTED DEVELOPMENTS UPDATE

By William Buckley, IHS Member

In the Third Quarter, 2007 issue of the IHS News Letter I presented the subject abstract. I am happy to report that the complete paper is now published in the April 2009 issue of SNAME's Marine Technology. I would be happy to receive any comments our members may have regarding it.

At the present time I am working on a second paper that is really a continuation of the first one. This one addresses the "nuts and bolts" of a First Principles Methodology (FPM) approach to seakeeping design with particular attention to "advanced concept" vessels.

UPDATE ON RODRIQUEZ RESEARCH AND DEVELOPMENT PROJECTS

(From Fast Ferry International, June 2009)

Immsi, the parent company of Rodriquez Cantieri Navali, has reported, "In 2008, due to orders acquired mainly in the military sector, RCN recorded a significant increase in net revenues compared to the previous year of around 8.5%, reaching €161.3 million from €148.7 million."

Revenue at the fast ferry division accounted for € 26.9 million (2007: €50 million) from construction of five 52 metre catamarans for the Sultanate of Oman and research and development related to the construction of two fully submerged hydrofoils and an AliSwath [passenger/car ferry]. However, Immsi says, "Production has still been characterized, particularly in the fast ferries and mega yacht sectors, by insufficient margins to absorb the direct costs of production and fixed overheads." Immsi's 2008 annual report continues, "Margins, especially on the Oman order at the fast ferries division, suffered from negative variations in estimates in relation to the technical problems of building the catamarans and additional costs sustained in the period between the delivery of the first boat and production of the other four vessels.

Rodriquez T-Foil Hullborne

"In the yacht division, Conam significantly reduced its contribution to the group due to significantly lower than expected margins on construction, delays in customers signing contracts, the suspension of production activities in the last part of the year as a result of the crunch in the world market for yachts and the ongoing lack of sales contracts.

"At the end of 2008, the overall order book [for Rodriquez Cantieri Navali] stood at around €284 million, of which about €252 was contributed by the military division; €16.7 million from the fast ferries division, mainly the order from the Sultanate of Oman; and the remainder from the yacht and mega yacht division.

"As a consequence of a significant increase in production, the Rodriquez group has significantly reduced its operational loss, from a net consolidated loss of €7.6 million in 2007 to € 2, 4 million in 2008."

Turning to the fully submerged hydrofoils and AliSwath, Immsi says, "Rodriquez continued the development started in previous years of two important research projects that both utilize financing from the Ministry of University and Research.

"Regarding the hydrofoils, in October 2008 there was a final inspection by the sponsor and the bank. During the visit the progress of the project was demonstrated. The project has an overall value of some €30 million. The company has made a formal commitment to conclude sea trials with costs to its own account.

"Regarding the AliSwath project, in October 2008 there was also a final inspection by the sponsor and the bank. The project has an overall cost of €20 million The company has made a formal commitment to conclude the construction of the prototype and carry out sea trials with costs to its own account."

Rodriquez has also been working on another R&D project that received Ministry of Transport financing in October 2007. According to Immsi, "The Wavepax' is a `wave piercing' type High Speed Craft for the transport of passengers and cars. The project includes a grant for activities begun in 2005 and ended in 2008."

ALISWATH UPDATE

By Lorenzo Bonasera, IHS Member

Shown here is a picture taken in Messina showing the AliSwath under construction. Compared with previous images, this shows that progress has been carried out very slowly. I do not know if the reason is due to financial/budget or to technical problems, but it seems still very far from the final assembly of hull and the lower body with foils.

AliSwath Under Construction

MORE ROLES FOR METEORS

From Fast Ferry International, July-August 2009

Recently a number of Meteor hydrofoils have been refitted for new roles. Activity has not been limited to the former Soviet territories however, one Meteor has been converted into a houseboat in the Netherlands.

The hydrofoil was built in 1975 and arrived in the Netherlands 23 years later. After being re-engined, the Meteor was operated by Jan Verkerk Ship Charters as *Meteoor* and later, in Germany, by Heinrich Hell Schiffahrt as *Rheinblitz.*

The Meteor's Newly Refurbished Bow Saloon

The Refurbished Aft Saloon

The Meteor subsequently returned to the Netherlands, the engines were removed and the interior was refitted with a living room in the bow saloon; a master bedroom, two other bedrooms, a storeroom, an office, a toilet/shower, a galley and a laundry room in the midships section; another living room in the aft saloon; and a central heating system throughout the vessel.

Earlier this year, the Meteor was moored in the Arnhem area and was being offered for sale for €140,000. According to the broker, the refurbishment was 85% complete and the owner, "a keen seller", was prepared to leave some furniture on board. The

The Meteor Operating in the Netherlands in 1998

HISTORIC NAVY HYDROFOIL AWAITS A FINAL HOME

[Adapted from a front-page newspaper article in the Kitsap (Washington) Sun on July 14, 2009; Courtesy of IHS Member Bruce Bryant.]

It was the fastest hydrofoil in the world. But now, FRESH-1 (for "Foil Research Experimental Ship Hydrofoil-1," and there were no others) is corroding in obscurity in Bremerton, Washington.

In 1963, the Advanced Marine Systems Division of The Boeing Company built this state-of-the-art hydrofoil research vessel for the Navy at a cost of about $2 million. It looked like a space capsule attached to two huge pontoons.

An unusual catamaran design with an interesting story, it has been wasting away for decades. Even if it is historically worth saving, a restoration is getting more expensive by the day. And owner Dave Symington, who himself turned 91 years young

Continued on Next Page

HISTORIC NAVY HYDROFOIL AWAITS A FINAL HOME

(Continued From Previous Page)

this month, has many other interests demanding his time.

FRESH-1's heyday was short but captivating. On July 18, 1963, a Pratt & Whitney turbojet engine similar to those that powered the 707s and B-52s of that era rocketed the 59-foot, 17-ton catamaran to the then and now world's hydrofoil speed record of 98.7 mph on Puget Sound.

The Boeing-Built FRESH-1 in "Flight" on Puget Sound

Later that day, while cruising at close to 80 mph, it flipped over no thanks to an onboard computer glitch off Vashon Island. The three person crew swam through the broken windshield as water rushed into the small cabin;. They were taken to the hospital, but soon released.

The aluminum craft was refurbished for about $500,000, completed its trials and was accepted by the Navy. Possibly influenced by the accident, the Navy shifted its focus to designing reliable 50-knot vessels and stopped pursuing 100-knot hydrofoils. FRESH-1 saw little action after that and was put in mothballs, though lessons learned helped with future hydrofoils.

It sat for many years in a shed at Puget Sound Naval Shipyard. In 1982, the Navy put FRESH-1 up for auction.

The then Mayor of Bremerton, Gene Nelson, envisioned it as a tourist attraction in Bremerton in the early 1980s. Then Nelson, at the urging of Central Kitsap developer Joe Mentor, asked the Navy to donate or loan the craft to the city as a tourist attraction. Mentor told the Bremerton Sun that the FRESH-1 "would be no replacement for the battleship USS Missouri when it leaves next summer (to be reactivated), but it would show that this area is in the forefront of hydrofoil development."

But they were too late. The auction had already been advertised and bids were coming in. Sam Kleinman, a Los Angeles surplus dealer, was the top bidder at $12,900. Kleinman, who dealt mainly with surplus medical equipment, planned to resell the hydrofoil, but couldn't find a buyer. He made a deal with Nelson to allow it to be displayed near the battleship until it could be sold.

Soon after, Dave Symington, a Seattle businessman who developed the Lake Symington housing area in Central Kitsap County across Puget Sound from Seattle, bought FRESH-1 as a historical artifact hoping to preserve the craft for future generations to observe and admire.

"Anything that wasn't removed from the FRESH-1 before it was auctioned has been stripped by kids and vandals," said Symington, "but the craft looks much like it did nearly 50 years ago. The hull and cabin are intact with the words 'U.S. Navy Bureau of Ships' still painted on the side. And what's left of the jet engine is there as well."

FRESH-1 "Aground" Near Seattle

Needless to say that any suggestions or offers to "Save the Ship" would be greatly appreciated by the many "Friends of FRESH-1," and International Hydrofoil Society..

[Editor's Note: In a recent telephone call with Dave Symington, Sumi Arima reports: The Museum Of History And Industry (MOHAI) Seattle has reconsidered accepting the FRESH-1. Sumi further writes: "The figure 96.7 mph seems excessive. I was in the chase boat when it flipped with Boeing's Program Manager Al Kennedy. The figure I heard was 72 knots which is about 80 mph. We had a telemetry established with a data van parked on Vashon Island recording the pertinent data. The FRESH-1 was on Builder's Trials at the time of the turn over. Verne Salisbury was the Boeing Pilot, Pete Sias was the Navy's Program Manager and observer in the co-pilot seat. Bob Hubbard, an ACS engineer was in the instrumentation seat. Pete suffered a nerve cut in his chin and was numb from then on. I was next in line to observe the ship's operation for the Builder's trials."]

HAYATE RC MODEL UPDATE

[Editor's Note: The text and pictures were previously published in the electronic copy of the IHS Newsletter. In the interest of those members who only see the printed hard copy, I have reproduced this interesting item.]

IHS continues via the BBS to follow Yoichi Takahashi's progress in constructing his radio-controlled model of a hybrid hydrofoil, called HAYATE. His progress was last reported in the 3rd quarter 2008 NL. As recently as New Year's Day 2009, it seemed that HAYATE was ready to launch. The R© controller was installed, and painting was complete.

Several Views of Yoichi's Beautiful Model

However, Yoichi had a brainstorm for ratcheting the accuracy and sophistication of his model up yet another big notch. He has now designed and will fabricate and install a split-style thrust reverser similar to that on the real HAYATE, which is on static display at the Kobe Maritime Museum. Yoichi used 3DCGDesign software to produce the views of the thruster shown on this page. He will continue to update his progress on the IHS BBS.

Former Navy personnel assigned to the PHM hydrofoil missile boat program will be interested to view Yoichi's impressive PHM model on video. To find these videos, just go to YouTube.com and search for "gasturvin."

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Disclaimer

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

HIGH POINT REUNION

By Terry Orme, IHS Member

We had a pretty good turn out for the High Point Reunion on June 20. Here is a photo with some of the attendees.

Left to right: Jeff White and wife Mavis - Vice President of Volunteer Group. Fred Nachbar and wife May - Served on HIGH POINT from Mar 75 - Oct 77. Later served as Chief Engineer from Jun 83 - Jan 85. Myron Lamoree & wife - Boeing Maintenance and Mechanical Service. Mitch Berdinka & wife - Served on PLAINVIEW May 72 - May 75. First as Assist. Engineer, Later as Chief Engineer.

Not shown is Dick Merritt and wife – He helped make original bid for construction of HIGH POINT at Tacoma Boat. Worked on Mod. 1 at Puget Sound.

[Editor's Note: Dick Merritt (IHS Member) wrote: "My wife, Joan, and I attended the High Point Reunion on June 20 in Shelton, WA. Myron Lamoree and I were the only Boeing people there. It was great to meet some of the Navy personnel from the High Point and even the skipper of the Plainview. We hope that this will be done again."]

HYDROSAIL UPDATE

By Tom Hamon, IHS Member

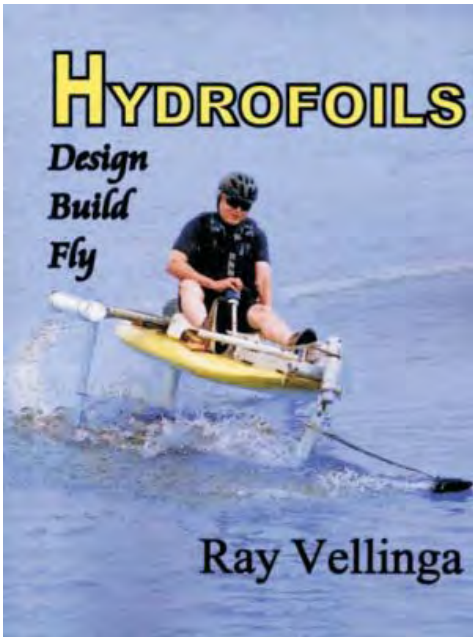
Tom has provided an update of his company and the people in Hydrosail. There are 3 of us Sam , myself, and Mike Mcgarry. We are all on HydroSail email. At present we are involved with Harbor Wing Hawaii and they sent an article about their project that I helped write a month or so ago. We are looking at new projects for the future but have not decided on any others at present. The Rave hydrofoil, that was designed by us, was sold to a company in Minnesota and they are trying to get it back in production, hopefully soon.

TOM LANG'S BOOK

Tom Lang recently wrote: I now have a publisher (WordClay) and a website (http://tglang.com/). So far, the website is a simple startup that includes a page that describes my thesis entitled: "A Generalized Engineering Design Procedure". The website offers a 300-page paperback book version for $34.95, and another page showing photos of my 1950's hydrofoil boats that includes a link to my article on these hydrofoil boats at the IHS website.

NEW HYDROFOIL BOOK BY RAY VELLINGA

Ray Vellinga, IHS Member, has released his book "Hydrofoils: Design, Build, Fly" on amazon.com, published by Peacock Hill Publishing, Gig Harbor, WA. This 250-page book addresses the challenge of how to design, build, and fly hydrofoil boats. It begins with the history and theory of hydrofoils, then explains flight characteristics such as stability, control, lift, drag, cavitation, and ventilation. Foil configurations, weight and balance, flying height, and roll management are covered as are calculations of stress, hull configuration, and foil sizing.



Ray demonstrates methods for comparing designs, and explores specific design ideas for motorized, human powered, and sail powered hydrofoils. Piloting and troubleshooting are followed by an extensive bibliography and index. There are over 270 illustrations, charts, and tables on the subject of creating hydrofoil boats.

USS ARIES HYDROFOIL MUSEUM

By Eliot James, IHS Member

While work on the Aries has slowed to a standstill until we find a new home for the museum, we have been busy adding to our museum exhibits and have added a new hydrofoil to the fleet, a Hy-Foil. This hydrofoil was built in 1968 in England. We have not seen others like her, but that is not unusual in the small world of hydrofoils. Bob and Bill Meinhardt outfitted her with a Johnson 25 hp outboard and we tested her out on Thomas Hill lake. There is no front foil mechanism to control foil depth, instead the inverted V acts as a surface piercing foil while the aft foil is fully submerged. There was no trouble getting up on the foils, but we found the craft a little unstable at speed. We believe some tweaking will significantly help and plan on that on our next test run.

This brings our hydrofoil fleet to 7

Recently Acquired Hy-Foil

vessels including the Aries, 1 restored Dynafoil, 2 un-restored Dynafoils, a Waterspyder, President Nixon's Volga, and 1 Hy-Foil. We have flown all but the two un-restored Dynafoils and the Aries. The Aries is capable of traveling hullborne.

I want to call out to all the members of the IHS and plead for help in developing a business plan, and helping us find a new home. We are approaching another winter and desperately need to have the ship and the entire museum moved south out of the dangers of Missouri winters.

We are willing to do whatever we need to move ahead and establish a national hydrofoil museum. We have the technical ability; we lack the administrative and philanthropic talent to move the idea forward.

HYDROFOIL SKIER

Contributed by Ken Spaulding, IHS Member

British solo sailor Alex Thomson. 34, tries his hand at "stand up foiling" with a Carafino Hydrofoil hoard behind his IMOCA Open GO Hugo Boss in the Solent off the Isle of Wight. It's pretty extreme: Thomson says: "At a certain speed the hull is lifted above the water and the craft skims along on the hydrofoils at great speeds. Its like snowboarding but just on water." Thomson recently completed his "3 in 3" trifecta of three round-the-world races in three years. His next bluewater race will be in the Rolex Fastnet Race in August.

Stand Up Foiling on a Board

FROM THE BOARD ROOM

The International Hydrofoil Society (IHS) Board of Directors met at 1500 on 8 October 2009 at the Army-Navy Country Club in Arlington, VA. Six of the twelve Board members were in attendance. The Treasurer's report was submitted by Frank Horn. The IHS has exceeded its revenue objective for the present date, and has a healthy bank balance. IHS has submitted a registration in connection with being a co-sponsor and exhibitor at the upcoming High Performance Marine Vehicles Symposium, 9-10 November 2009 at the MITAGS facilities south of Baltimore near BWI airport.

NEW HONORARY LIFE MEMBER

From time to time, the International Hydrofoil Society Board of Directors selects fellow Hydrofoilers who have made major contributions to the hydrofoil community. Recently, the Board selected Alain Thebault as one who has been the driving force behind the development of the sailing hydrofoil l'Hydroptere and presented him an award as HONORARY LIFE MEMBER of the International Hydrofoil Society.

International Hydrofoil Society

Award Citation

Alain Thébault

On the occasion of the speed sailing hydrofoil trimaran l'Hydroptere achieving the milestone of becoming the fastest sailing craft of any type in the world the International Hydrofoil Society congratulates Alain Thébault and his team for this remarkable achievement and honors him for his valuable contribution, over many years, to the technical development and promotion of hydrofoil sailing craft, and most notably his leadership of the l'Hydroptere team.

In recognition of his contributions, the Board of the International Hydrofoil Society hereby presents Alain Thébault the award of **"Honorary Life Member"**. For this, all IHS members join in recognition of his contributions in the form of this special Award.

Alain has for many years been the driving force behind the development and refinement of the sailing hydrofoil l'Hydroptere stemming from his work with earlier foil supported sailing boats. Despite occasional setbacks with the project, which are to be expected with such a leading edge design, Alain has remained steadfast in his determination to demonstrate the sailing performance that is possible from a large offshore sailing hydrofoil. The achievement of outright speed sailing records for distances of both 500m and one nautical mile, with progressive improvements in speeds achieved over recent years, is testament to that determination. The IHS also acknowledges Alain's significant achievement in fostering corporate sponsorship for such a substantial project and assembling and motivating the talented and dedicated members of the l'Hydroptere team, whether engineers, sailors or other supporting personnel.

The achievements of l'Hydroptere over recent years have lead to significant publicity for the project which in turn will have increased public awareness of the performance and efficiency advantages of hydrofoil craft.

We wish Alain and his team ongoing success in seeking out further speed sailing and endurance records beyond the significant milestones already achieved up to 4 September 2009.

The International Hydrofoil Society takes great pleasure in presenting this award to Alain Thébault who has devoted a significant part of his life and energies to the advancement of hydrofoil sailing.

FOUNDED 1970 LONDON

October 8, 2009
Date

John R. Meyer
John R. Meyer, President

SAILOR'S PAGE

Intergalactics and Midwinter Championships, Islamorada, Jan. 2009, Florida Keys &Uni-rig A-class North American Championships, Fort Walton Beach, Florida Update by David A. Carlson, May 2009

[Editor's Note: This is a continuation of the article from last quarter's NL.]

I just returned from the A-class North American Championships at Fort Walton Beach, Florida. There were two curved-foil Marstroms participating, with John Schiefer of Coconut Grove Sail and Canvas, and Skip Elliot of California sailmaking fame. John's was a new boat for sale by Goran Marstrom, and Skip's was retrofitted recently in California. The first race had heavy air from a thunderstorm only just before the finish, so this was far too short a time for clear effects from curved boards to be seen or to be effective. The remaining 10 races were all in light to medium air, with light trapeze work needed. The curved board boats were not particularly high placed as Skip had a 9th place in race 1, but placed 15-31, or almost 20 points lower afterwards. It appears that Schiefer was a few positions higher than his usual result. However, Lars Guck (1st), Pete Melvin (2nd) and Matt Struble (3rd) were dramatically faster than everyone else with conventional modern boats and Glaser or Ashby sails. The Marstroms were good at the slow downwind legs as usual which is a well- known Marstrom hull advantage for large sailors. However all high finishers were good at doing the Wild Thing (heeling downwind and sailing fast on one hull with these uni-rig boats) in nearly all air, which is a learned skill. A number of participants were sailing then new Ashby A-cats with symmetrical daggerboards that are canted inwards, thus providing lift, especially while doing the Wild Thing. But the most recent Championships in Australia 2009 were won by Glenn Ashby on his new boat now for sale with curved boards.

Goran Marstrom's new curved daggerboards installed on John Schiefer's Marstrom A-cat at the A-class Intergalactic Midwinters. On the left is Skip Elliot who sailed well with the curved daggerboards on a Marstrom. On the right is another competitor, Mark Herendeen.

So the jury is still out on curved boards: they appear to be useful in a breeze, but not necessarily downwind, which was to me is contrary to expectations, if Wild-Thing conditions with speed are met. Fastest sailors are able to maintain Wild-Thing conditions in 6 knots of breeze, which is amazing to me. The straight, inward-canted Ashby's of Nov 2007 had perhaps more of an advantage downwind. Thus some arithmetic is needed for analysis of configurations that give the best overall results for a typical race course and various wind speed. Recent developments include: May 30 worldwide referendum was held by the International A-class Association on these boards, and they were approved by a majority of the class members. At least 5 commercial sources overseas provide curved banana boards and trunks for $2500. Rock and Roll: we USA racers are years behind!

l'HYDROPTÈRE ACHIEVES OUTRIGHT WORLD SPEED SAILING RECORD

(Edited from reports on: www.hydroptere.com)

In the 4th Quarter 2008 newsletter, we reported on two new speed sailing records achieved by the *l'Hydroptère* team (www.hydroptere.com) but shortly afterwards the craft capsized during December 2008. All is well that ends well however. The team has remain committed to challenging the absolute speed sailing record of 50.57 knots achieved by French kite surfer Alexandre Caizergues at Luderitz, Namibia, on 4th October 2008 over a 500m distance. So *l'Hydroptère* was rebuilt during 2009 with various modifications incorporated with the aim of in-

L'*Hydroptere* Speed Sailing, La Seyne sur Mer, France

Continued on Page 11

creasing top speed. This has now paid off.

On Friday 4 September 2009, in Hyères harbour in France, *l'Hydroptère* became the fastest sailing boat on the planet over both 500 meters and one nautical mile. *l'Hydroptere* achieved the outright speed sailing record (across all categories) when it surpassed the record held by Alexandre Caizergues for the 500m distance while at the same time the team increasing their own outright speed record over one nautical mile.

***l'Hydroptere* Speed Sailing, La Seyne sur Mer, France**

Alain Thébault and his crew of ten achieved the double record of 51.36 knots over 500 metres and 48.72 knots over one nautical mile. These speeds are subject to ratification by the World Sailing Speed Record Council. The previous speed records held by *l'Hydroptere* were 46.88 knots over 500 metres (a record for D-Class with sail area greater than 27.88 m^2) and 43.09 knots over one nautical mile (which was the previous outright record for that distance).

These speeds were achieved with an established westerly wind of about 25 knots gusting to 28 knots with relatively flat seas. The record runs came after a day of steadily improving results as is evident from the running reports in the 'news in brief' section of the team website. On occasions during these speed runs, top speeds of up to 55.7 knots (103 km/h) were logged on the on-board GPS unit. The double record was achieved during the 8th and last run for the day.

For the record run, Alain Thébault and his crew composed of Anders Bringdal, Jean-Mathieu Bourgeon, François Cazala, Damien Colegrave, Stéphane Dyen, Matt Hodgson, Jérémie Lagarrigue, Pierre Trémouille, Gérard Navarin and Jacques Vincent.

After the result, Alain Thébault remarked: "Today the crew was just majestic for this fantastic record, the true representation of a collective work, from an "hydropterian" team very close and determined. The accelerations at over 100 km/h create intense sensations on board that we have never experienced before". Acknowledging the design effort put into *l'Hydroptere*, he added: "We should not forget that this record is above all a technological adventure and a team work which could not have been possible without the support of our partners". Also recognizing the sponsorship support for the project he stated: "It is mainly thanks to my partnership with Thierry Lombard, managing partner of the private banking house in Geneva (the foundation year "1796" is mentioned in the mainsail), that *l'Hydroptère* has had the support of a "principal partner" since 2005 and that we started the quest for these records and we could beat them."

Thierry Lombard is also at the origin of the partnership of *the l'Hydroptere* team with the Swiss Federal Institute of Technology in Lausanne (EPFL). The Swiss institute has brought its support in such matters as aerodynamics, composite materials, structural behaviour and video-imaging. The EPFL has put the knowledge of its professors and students, its creativity and calculation power at the flying trimaran's disposal.

The team will continue their record campaign at La Seyne sur Mer until 7 October, the end of the period allowed by the WSSRC, in an effort to achieve an even greater speeds if appropriate weather conditions are obtained during this time.

Following the success of the team in achieving records over these shorter distances, with the support of engineers from the aeronautics industry working on a purely voluntary basis, Alain Thébault's is already dreaming of new projects. He sees the next challenge for the boat, re-configured as before for open seas sailing, being to take on long distance records. Thus *l'Hydroptère* is the only sailing boat capable of beating the absolute sailing speed record while also being capable of sailing in open seas.

The Elated Team of *l'Hydroptere* Having Achieved Their Record Speed Run

WELCOME NEW MEMBERS
(Continued From Page 2)

Operations; Plans Officer MACV, Saigon; Head of Surface Junior Officer Assignments, Bureau of Naval Personnel; Student, Industrial College of the Armed Forces; Appropriations Manager for Naval Shipbuilding; Commanding Officer, U.S. Naval Station, Subic Bay; and Director, Strategic Sealift Division from which he retired in June `86 after 30 years of Naval Service.

IF WE HAD PHMS TODAY
(Continued From Page 3)

ment, providing space can be made available, thereby enhancing mission capability. Likewise, subsystem weight growth, to provide robustness and improved availability, can be traded off for fuel with only a relatively small impact on range. The reader is referred to the paper for specific analyses and their results.

Let us not forget: On the occasion of "Ocean Venture, 1984", Commodore K. G. Dorsey COMCARGRU Four said: ''PHMS have brought a new dimension to surface warfare; PHM's speed, small radar cross section, weapons suite and fire control system provided Commander Carrier Battle Group (CVBG) with a formidable offensive weapon; PHM performance has been superb; you have proven PHMS can operate effectively with a battle group and are welcome back any time.'' This implies that the PHMS were doing a great job and were compatible with other fleet assets.

As previously stated, we (NAVY) should investigate what an improved PHM would look like in light of current technology. This undertaking is getting more imperative every year. This is primarily due to the continuing loss of civilian and Navy expertise in the design, development, and acquisition of this LO-MIX-type ship. A PHM with a much increased strategic mobility, allowing ocean crossings without a refueling ship may be possible. So let's get on with it!

[Editor's Note: During the time period of 1983 through 1984 Captain Frank G. Horn was the first hydrofoil Squadron Commodore to have six hydrofoils under his wing. He, the Squadron personnel, and all of the ship's crews were eager to demonstrate the Squadron's ability to be a reliable, powerful element of Navy Seapower wherever they were ordered to operate. As suggested by the Squadron's emblem,

CHATTANOOGA OPERATION

By Jack McDonald

There is a 72 passenger foil-assisted catamaran operating in Chattanooga with multi-trips daily to the Tennessee River Gorge, which I thought of interest to IHS members. It is pictured on the cover of the Chattanooga phone book. I got my daughter to photograph the phone book, shown here.

NEW BENEFIT

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

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EXTRA FOR THE WEB EDITION

Book Review

Hydrofoils: Design, Build, Fly

by Ray Vellinga

You don't have to love math to love Ray Vellinga's book *Hydrofoils: Design, Build, Fly.* You don't have to design a hydrofoil from scratch to get full use out of it (though terrific mathematical tools are here to help you do it). A hydrofoil in flight is a dynamic system in constant state of balance. If any parameter goes out of balance without being counteracted instantly, then your flight is over; sometimes precipitously over. Use this book to help you use the system, not be run over by it.

The book begins with history. Thomas Moy discovered the hydrofoil serendipitously in 1861 while trying to design airplane wings. Hydrofoils, it turns out, are not just been the province of tinkerers, graduate students, and leather-faced sailors. Alexander Graham Bell, when he was not talking on the phone, built a really fast one. The world's navies built hydrofoil warships. As a former US Navy officer, Ray Vellinga recommends that the Navy abandon destroyers and cruisers altogether in favor of hydrofoils. His rationale: Less rust; more fun. It makes perfect sense to me, if not to shipbuilders or the Secretary of the Navy.

Ray eases you into hydrofoil design principles by starting with flight characteristics: stability, control, and trim; lift, area, and speed; drag and power; and ventilation, cavitation, and stalling. Especially helpful is Ray's careful grouping of interrelated characteristics so you begin to grasp conceptually how these factors will interoperate when the hydrofoil actually flies later in the book. You become comfortable with this. You get this stuff. Not only that, but the way Ray tells it, this stuff is funny.

With those natural characteristics established, the ensuing chapters illuminate the various design parameters, explaining how they work together or in opposition: weight and lift distribution; height and pitch; steering and roll; materials, stress calcs, and fabrication; selection of hull (and motor, if applicable), foil profile, plan-form, and aspect ratio.

The dynamic system of hydrofoils in flight sneaks up on you and comes together during the course of all this, whether or not you dive into the math. Ray puts it altogether on the printed page better and more palatably than I have ever seen it done. But that's as far as Ray can go until Hollywood buys the rights and makes the book into a movie. For now you must contemplate the text until the beautiful dynamic of hydrofoil flight comes alive in your mind. It will happen. It's like winding a watch and then watching the gears and springs come to life. Don't give me that face… you can do it. Start winding that watch now.

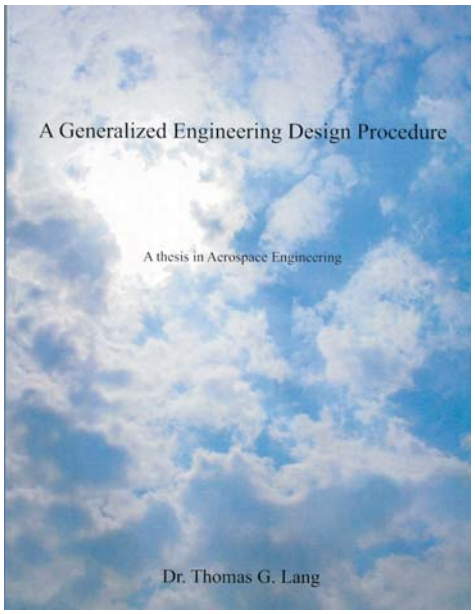
The hydrofoilers' world has been Balkanized since the glory days of hydrofoils faded in the 1960s. Hydrofoilers are isolated into special interest groups now with little interaction, first according to propulsion: motor, sail, or human power (or kites, or surf); then by use: military, commercial, or recreational; then by geography; then by geopolitics: (USA vs. USSR); then by area of interest: restorations, new designs, foil add-ons, water skis and wake boards, university projects, garage hobbies, or personal remembrances; then by size: static or radio-controlled scale model, 1-or 2-person runabout, pontoon houseboat, oceangoing yacht, major warship.

Hydrofoils: Design, Build, and Fly is common ground for all hydrofoilers in its compelling elucidation of the fundamentals all hydrofoils must obey, but differences are also satisfied here. Individual chapters are dedicated to individual interests: modeling, sailing, motor power, and human power.

Then you come to the final chapter on piloting and troubleshooting. The chapter begins, "If you think designing and building hydrofoils is fun you'll go nuts when you first fly one. They are exciting because they truly fly." Now there is your common ground. There is your motivation. Ray's book may just be the beginning of a New World Order for hydrofoils (though in a good way, without the black NATO helicopters circling ominously in the night). Hydrofoils rule, but they don't design, build, and fly themselves. If hydrofoils are to rise to their former glory, hydrofoilers around the world must find, embrace, and communicate their common ground. *Hydrofoils: Design, Build, and Fly* is a perfect and affordable start.

Barney C Black
IHS Life Member

IHS Mugs are For Sale
www.foils.org/ihspubs.htm#mug



Tom Lang's Website Debuts

by Barney C Black
IHS Life Member

IHS receives inquiries fairly regularly about how to build a hydrofoil boat or add hydrofoils to an existing sport watercraft. People of many interests inquire. They are students, speed boat enthusiasts, hobbyists, sailors, radio-control modelers, houseboaters, and more. The first place I send them is to is the International Hydrofoil Society's web page on Tom Lang's Up-Right foil kits located in the Hydrofoil Pioneers section at www.foils.org/upright.htm. You won't find detailed instructions there, but you will find reassurance and inspiration. Tom Lang is a person who has actually designed, built, and flown hydrofoil motorboats (there are pictures to prove it). He even designed and marketed a set of add-on foils known as the Up-Right Hydrofoil Kit, a product that unfortunately has been discontinued.

The second place I send people is to the IHS Bulletin Board. Tom Lang posts there occasionally and has been generous of his time and knowledge in providing answers and calculations for hydrofoil design questions, provided the questions are focused and specific enough to be answerable. Tom has been doing this for a long time, dating back to before the automated BBS was created. So people interested in this topic would do well to browse through the archived pre-BBS messages on adding foils; go to www.foils.org/motofoil.htm.

Now there is a third place for hydrofoil designers to go. Tom Lang has initiated his website at http://tglang.com. There you can order a bound copy his doctoral thesis: *A Generalized Engineering Design Procedure*. Dr. Lang's doctorate is in Aerospace Engineering, so what, you might ask, would a hydrofoiler find of interest in this book?

Fulfilling his title's promise, Tom presents a basic engineering design theory and from it develops a generalized engineering design procedure. A specific objective is to find the best design that satisfies a given design goal. A more general and powerful objective is to find all of the best designs, and the families of designs, that satisfy an entire field of design problems.

And there is lots of great math! I predict that you are going to find yourself working through this math, not as a means to keep your mind sharp into old age like working through Sudoku, but because this procedure and this math are a hydrofoil designer's call to action.

Theory and procedure come together to make this book useful and real. Remember the Up-Right hydrofoil kits? Unlike the cartoon professorial stereotype, Tom is not a disembodied brain bobbing around in a jarful of contemplation; he is an inventor, tinkerer, and innovator. He does this stuff for a living, and he does it for fun in his garage and on the water. He holds patents.

Tom works through examples in his book – some are simple; others… well, not so much. This practice in application helps you massage the math into the follicles of your scalp so you can really use it to tackle your own design goals. Can there be any doubt that the hydrofoil's salvation is in hands of the engineers? Here are the examples that you

Continued on Next Page

Tom Lang
(Continued From Previous Page)

will work through: (1) submerged vehicles; (2) low-speed airplane wings and non-cavitating hydrofoils; (3) hydrofoil cross sections; (4) group theory and design form transformations - generally and applied to specific foil cross sections; (5) effect of sweepback on the incipient cavitation number of hydrofoils; and (6) cavity drag coefficients for hydrofoil truncated ellipse cross sections.

Theory and procedure; think and do. Those are the keys to happy mind and hands, designing and building. The thinker flies aloft on theory; the designer bends lines to his will with procedure; and the builder cuts through wind and waves in a speeding hydrofoil! Whether you want Tom's book or not, I recommend that you visit the website at http://tglang.com to get acquainted and then return from time to time to watch it grow. You *will* be fascinated. You may even be helped.

Can It Be Built?

Canadian free-lance designer Matt deBellefeuille, a 2008 graduate of Toronto's Humber College with a degree in Applied Technology - Industrial Design presents the MR1 Foiljet concept, created in collaboration with Industrial Designer Robert Vandenham on his website at www.debelle-design.com.

The Foiljet MR1 would ride on fore and aft hydrofoils mounted on retractable struts. The craft would be prop driven via a 15 kW electric motor powerd by a rechargeable 48v battery. To sustain constant height and level flight, the foreward foil will need continuous adjustment either manually from a handlebar lever or via an automatic control system. Matt can be contacted by email at mdstudio@live.com.

Foiljet MR1 Concept by Matt deBellefeuille & Robert Vandenham

PREVENTION OF VENTILATION IN SAILBOAT HYDROFOILS

By David A. Keiper

18 September 1974

In sailboat hydrofoils, the problem of ventilation is far more complex than with powerboat hydrofoils. In powerboat hydrofoils, fences are generally used to prevent the occurrence of ventilation, though occasionally sweep has been used.

We may define the sweep of a foil element as the included angle between the foil element and the projection of the foil element onto a plane perpendicular to the water flow direction. If the foil element sweeps aft as it comes up to emerge from the water's surface (i.e. the deepest or lowest portion of the element is forward of the other portions) by an angle of 10 or 15 degrees (or more) ventilation dropping of the boat can be fairly well prevented. Sweep angles less than 10 degrees are relatively ineffective in preventing ventilation. On powerboats, we may consider the direction of water flow as generally corresponding to the fore and aft axis of the boat. However, on sailboats, the water flow direction may take wide excursions from the fore and aft axis of the boat.

A sailboat differs from a powerboat in that the driving force is nearly halfway up the mast and pushes the boat more sideways than forwards. The wind is also a very unsteady power source, varying from second to second. In addition, sufficient wind power usually means that there is also a wave chop present. The result of all this is that:

- The boat makes leeway, with two results:
  - » Fences become badly angled to the water flow direction, leading to excessive drag
  - » The sweep of dihedral foil lifters on the boat's leeward side is effectively reduced, or may even be reversed, leading to ventilation. This is especially important because the leeward side of the boat carries the most load.
- Sailboat hydrofoil elements are subjected to far more rapidly varying loads than on powerboats, on the average. This appears as widely varying angle of attack excursions on the foil elements, especially on forward and lateral foil elements. Ventilation is promoted when angles vary widely from design. A sailboat lifting rapidly out of the water, as when it catches a sharp wind gust, experiences water flow directions on leeward dihedral lifting elements that reduce the effective sweep and promote ventilation, both from leeway and rate of climb.

The mechanism of ventilation is that air tries to pass downwards along foil elements from the water's surface to decrease any suction pressures developed on the foil1 surfaces. Ventilation propagates itself downwards especially along surface-piercing elements. A disturbed water surface, as from waves, tends to promote ventilation. Bow and lateral foil unit lifters normally have higher angles of attack than stern foils, thus build up more suction pressure, and

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***Williwaw*'s side foils are attached to the trimaran's pontoons and can be retracted by hand**

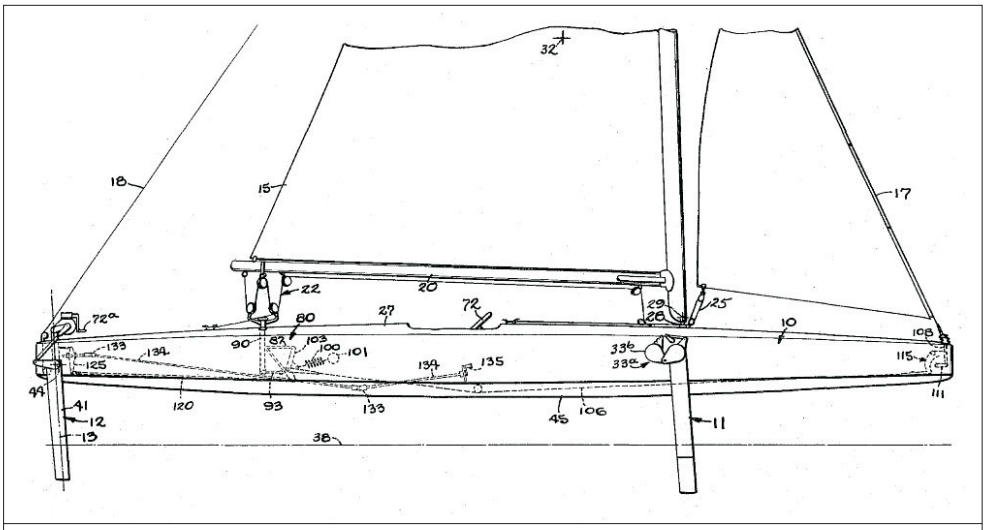
Side view of *Williwaw* showing sweep of the side and bow foils

Foil Sweep
(Continued From Previous Page)

are more susceptible to ventilation. Bow and lateral foils also suffer wider excursions in angle of attack. Stern foils of zero dihedral lifters don t appear to require sweep, but the supporting struts are usually given about 4 deg. of sweep so that the normal (lift + drag) vector passes directly through the struts. Sweep works in controlling ventilation because disturbances at the water's surface cannot propagate themselves "backwards" in the time dimension to reach portions of the foil element which are forward and deeper.

The [Gordon] Baker foils appear to have a sweep of approximately 4 degrees. His purpose was to pass the lifting loads directly up through the struts, for structural reasons, so that lifting forces would not complicate his mechanical computer foil adjustment scheme. The Baker craft is designed to sail so that the craft makes zero average leeway, accomplished through his foil adjustment mechanisms, and so his craft does not find moderate sweep to be necessary to prevent ventilation (at least in his typical sailing conditions, on inland protected waters). The Keiper foil invention - use of moderate sweep on sailing hydrofoils - answers the needs of those preferring to use (the simpler) fixed foil units and sailing in particularly rough water conditions. The foil units themselves are strong enough and well fastened directly to the hulls, without long spindly tubes as in Baker, and so the (lift + drag) vector passing somewhat forward of the foil unit, because of swept elements, causes no undue flexure.

[Publisher's note: Dave Keiper defended his patent claim on foward sweep of the foils. The examiner was unconvinced. The full text of Dave's patent US3561388 can be viewed on the internet at www.patentsfreeonline.com].



Above: Drawing from Gordon Baker's patent US2856879 show slight sweep of the foils. Below, right: Baker's hydrofoil sailboat *Monitor*.

Why 4 Foil Assemblies?

Hydrofoil sailing craft have used a 3-foil system. In a 3-foil symmetric system, one foil unit is burdened heavily, supplying both lateral stabilizing forces and longitudinal stabilization against sail forward pitching moments and wave encounter. One cannot maximize both longitudinal and lateral stability. In *Williwaw*, a 4-foil symmetric system acts as a 3-foil asymmetric system when the craft heels a moderate amount from the sail forces. In coming about, no readjustments are needed, since heel in the other lateral direction effectively switches the system over. Moreover, the 4th foil, normally airborne on the windward side of the craft, can help protect the craft from a serious high speed crash drive if the bow foil loses lift through wave action. As the bow foil loses lift and starts dropping, the airborne windward lateral foil comes into action to give necessary support. The lateral foils and stern foil combination stabilizes the craft with a longitudinal trim angle only a few degrees lower than normal trim using the bow foil. That is, the stern and lateral foils provide a longitudinal righting couple to prevent the craft from taking a steep dive, giving the bow foil time to recover its own lifting action, without the boat getting into an irreversible dynamically assisted crash in which negative bow lift generates more negative bow lift, with the craft's momentum quickly producing a stem-over-bow capsize as can occur in a 3-foil system. If the loaded leeward lateral foil should lose lift through wave action, the craft will heel and spill wind from its sails, reducing the heeling force. Slender, buoyant pontoons provide protection from capsize in an extreme case. With bow and stern foil maintaining the craft in proper fore-and-aft trim angle, the leeward lateral foil can recover lift quickly. Essentially, the foil system is able to fail safely.

LETTERS TO THE EDITOR

Hydrofoil Safety

I am a university student in Canada doing his final year mechanical engineering project with a few others on the design of a retrofitable automatic control system for changing AOA of the hydrofoil flap. I am currently analyzing the safety aspect related to our design for a leisure boat (boat size is just around 5m to 9m in length). I am just curious if anyone may know where I could find safety standard/guidelines related to such type of mechanical system for hydrofoil. Our system, mainly consisted of a motor that directly drives the flap at the tail of the foil, will be external to the strut, not on the inside, so everything we are doing has to be waterproof as well.

I tried to find info on existing fail safe locking mechanism for flap as well (in situation when control sys fails)...if anyone knows of any resources on this, that'll help tremendously. By the way, our design is of the fully-submerged type, with retractable struts (not our group's part)

Chris

Response…

Is the boat a submarine or a surface vessel? If it is a surface vessel - why do you need flaps at all for the forward foil? If it is a mono foil system, these are generally not very stable and lead to porpoising when AOA is too great and does not work if AOA is too low. The angles are very small and critical for the forward foil and measured in 10ths of degrees. Flaps are not a good idea at all, and expensive to include in any hydrofoil design, especially if you want to automate it.

In case you do - you have to control the control from somewhere which normally means setting the height of a position in the bow, which means adding a sensor to constantly measure the height of the bow over the water and feeding that to the mechanism that is going to control the flap. More expense - more hassle.

Assuming as surface craft - there are 3 parts to foil operation.

- Displacement phase. Trim - 0
- Transition phase. Trim varies but normally in the positive
- Planing Phase - where trim is a condition of foils.

Therefore the AOA of the foils can be set for the planing phase. Also foils attitude depends upon power - if your engines have a trim setting that is normally fine to set the trim of the boat in the planing phase. Ditch the flaps.

Gerhard Kutt

Share the Wealth... PLEASE!

If you have not been using the IHS on-line bulletin board (BBS), here is what you have been missing.

The Letters to the Editor section was discontinued as a regular NL feature after IHS established its on-line bulletin board (BBS). Moving the correspondence on line provided many benefits, including faster response times, a search engine, and wider audience of potential advice givers (or commiseraters). The BBS also freed up a lot of the NL editor's and webmaster's time to work on other features of the IHS site.

There is a glitch, though. Many IHS members know each other through work, membership in IHS, SNAME, etc. or through the BBS. Some email each other directly instead of using the BBS. This deprives the rest of the hydrofoiler world of seeing and participating in some highly interesting exchanges that are then lost to the record. It also tends to keep some experienced hydrofoilers from checking the BBS regularly and participating in that world-wide forum both to help others and to learn from them. Quite a few BBS posts go unanswered now because of this practice, and the experts who do participate can be overburdened. As it says on the BBS:

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

Fin Area Calcs

How can I calculate fin area needed for a R/C submarine? Or how can I calculate wing loading for it? I know there are tables for wing loading of aircraft, but I don't know any references for underwater vehicles.

Hamid Yooshij

Response…

You can treat submarine fins as a type of hydrofoil. Hydrofoil lift is calculated as shown below (taken from my book, *Hydrofoils: Design, Build, Fly*, available at amazon.com, **ISBN-13:** 978-0982236116):

The formula is borrowed from aerodynamics and is shown:

$$L = \tfrac{1}{2} \rho V^2 * S * C_L$$

We can calculate the value of ½ ?, Where ñ (rho) = density of the fluid. The

Continued on Next Page

Letters to the Editor
(Continued From Previous Page)

density of seawater is 1.99 slugs and when multiplied by ½ the result rounds off to 1.00.
Because ½ ρ = 1, we can simplify the formula to:

$$\mathbf{L = V^2 * S * C_L}$$

L = Lift, pounds. Lift equals weight when flying straight and level.

V = Velocity in ft /sec (note: 1 mph = 1.47 ft/ sec)

S = Surface area of foil, projected vertically in square feet, ft^2.

C_L = Coefficient of lift, this is a dimensionless number found in tables of wing profiles as in *Theory of Wing Sections.*

To solve for Surface area use:

$$\mathbf{S = L / (V^2 * C_L)}$$

If you do not have access to *Theory of Wing Sections* or other COL here is simple table (based on the NACA 63-412 section):

AOA	Coefficient of Lift
0	0.272
1	0.381
2	0.490
3	0.599
4	0.708
5	0.817
6	0.926
7	1.035
8	1.144
9	1.253
10	1.362

Ray Vellinga

Inflatable Foils?!

I am researching hydrofoils to retrofit to a catapult inflatable catamaran that I restored 2 months ago. I purchased from your site the Dave Keiper CD as well as the sailing hydrofoil book and the other hydrofoil CD. I am not searching to break any speed records. I don't want to be too technical but more or less experiment and see what happens. I will try both surface piercing foils like hydrosphere and submerged foils like those used in the Trifoiler, Rave, and Moths.

On the submerged foils: My question is about getting a good look at how the mechanical link used in the moth or Rave works. By my estimations the weight of the catapult is about the same of the Rave so I have a pretty good idea of the dimensions needed for the front two foils and rudder foil. I will probably use the NACA 63412 section and have a good idea how to join the flap to the foil but I lack imagination on the rod link as well as the teleflex link between the rod controlling the flap and the actuator on the surface sensor batten.

I hope someone can help me with this subject. I have spent about 10 week nights trying to find threads like this in the IHS website, but have not found concrete examples. My personal profile is basically of a monohull sailor and a proa builder/sailor so nothing in common with hydrofoils members with the vast background in engineering and foil design.

Carlos Solanilla
Miami, Florida

Responses….

None. Perhaps one of the experienced hydrofoilers in IHS or elsewhere can chime in with an answer?

Continued on Next Page

Catapult Racing Catamaran
www.catapultcats.com

Inflatable Hulls (Turned Upside Down to Show Dagger Boards)

Introducing Catapult

Catapult is the only true single-handed racing catamaran, with no assistance needed when rigging, launching, or sailing. The inflatable Hypalon hulls resist damage, and the boat can rest on them at the water's edge to be slid in. A stiff aluminum frame supports slender inflatable hulls. Weight is only 95 kgs (210 lbs), making Catapult fast for a 5m (16ft–4in) boat. The light weight allows racing performance with a 10 sq.m. sail area, so that it's easy to sail and is forgiving of mistakes. The hull shape (with maximum draft well aft) makes for quick and predictable tacking.

Seaplane Hydrofoils

I have been a sailor all my life, both water and ice and worked in Sanford, Maine as an A&P mechanic (Boston University) for Aerofab on the LA-4 empenage, doors etc. There was a big layoff and 70 or so of us were given the pink slips one Friday - about 1961 or 62. After a year of waiting I turned to commercial fishing - BUT kept an eye on the airport. Thurston, of the Aerofab Co. (Thurston-Erlandson) had moved to the airport and was working on a hush-hush program for the Navy installing a single "T" foil beneath and just ahead of the step on one of the Lake amphibians. I heard all sorts of rumors about the leverage arm length and drag during landings and other comments with no concrete info. I was involved with trim tab work and was aware of the huge moment problems created by the engine on the pylon. The trim tabs would probably have been enlarged and their deflection increased to test the hydrofoil.

Have you heard anything about those experiments? I am sure Gordon Baker was involved, but have found no trail to follow.

I have been a member of the multihull association here in New England for 10 years or so and have sailed in Bill Dolgers Newick designed tri. I sail with the New England Ice Yacht Association in the winter using a Jeff Kent carbon mast. For work I design and install systems for zero energy housing.

I dream of flying on the end of a very large windplant and watching the molecules fight their way around the leading edge. Some of them find their way into the vacuum in the foil created by centrifugal force through the boundary layer control holes as a means to re-

tard stall during peak wind gusts. I guess we cannot stop our minds from playing.

Peter Ashley
Natural Energy Consultant

Responses…

Info about this is located on the IHS site at www.foils.org/students.htm . Go there and scroll down to the topic heading "Hydrofoil Assisted Take Off for Flying Boat." Or you can search on that page for "Thurston" and jump right to it. Also, following is an article citation from www.foils.org/popmags.htm:

Levy, Howard, "HRV-1 Hydrofoil Amphibian," *Air Progress - The News Magazine of Aviation,* Condé Nast Publications, New York, Feb 1968, vol 22 no. 2, pp. cover, 38-39, 73-74. "... the hydrofoil seaplane can operate in sea states three times the size safely handled by a basic seaplane... For almost five years, David B. Thurston, President of... Thurston Aircraft Corporation of Sanford Maine has been conducting relatively unpublicized hydro-ski and hydrofoil development and flight evaluation programs for the US Naval Air Systems Command (NAVAIRSYSCOM)... It was during spring 1964 that the Naval Air Test Center at Patuxent conducted an evaluation of an Edo-developed Grunberg hydrofoil on a Grumman JRF-5G... A second generation seaplane hydrofoil configuration called for a single, small foil positioned below the hull. The resulting design was a single super-cavitating, penetrating hydrofoil considered suitable for use on the Grumman Hy-16 Albatross... a modified 1960 Lake LA-4A Skimmer amphibian was chosen as a scale flight test bed."

Barney C Black

In his response, Barney provided a link to an earlier posting I made summarizing the relevant content a paper titled 'A Review of Sea Loiter Aircraft Technology' from the AIAA / SNAME Advanced Marine Vehicles Conference, Arlington, Virginia, September 20-22, 1976. (Paper No. 76-876). I included images of the LA-4 with ski/foil attached from that reference. What I didn't mention is that the paper also describes experiments on an LA-4 with an "Air Cushion Landing System", an approximately 2 ft deep doughnut-shaped bag mounted under the fuselage operating on the same principal as a hovercraft. This same system was also tried on larger aircraft, namely the ACLS equipped XC-8A Buffalo military transport aircraft. More information on the ACLS work is contained in earlier issues of Jane's Surface Skimmers (at least up to the mid 70's issues).

Related to experiments with hydrofoils on aircraft, some time back I stumbled across a YouTube movie clip of take-off / landing trials of the foil equipped Grumman JRF-5G Goose. I don't have the link at hand, but it shouldn't be hard to find and is worth viewing as a blast from the past.

Martin Grimm

I found the video you mentioned. The beginning is actually a Goose on skis, but the hydrofoil version is shown a

Continued on Next Page

few minutes in. Here is the link: www.youtube.com/watch?v=yolgS1bn7P8. Or you can search YouTube.com for "seaplane history goose". Thanks for making us aware, this is a good video.

Scott Smith

Commercial Foils in USA

Does anyone have a list of locations/companies that use hydrofoils in a commercial capacity in the US?

Jason B.

Response…

There are 2 Hydrofoil Supported Catamaran ferries operating in the U.S. Both operate between LA and Catalina Island.

- Built by Kvi Chak boats - GRP - called Marina Del Ray Flyer. Foil system designed by CAE Marine - South Africa - Dr. Gunther Migeotte. See www.catalinaferries.com.

- Built by GEO shipyards in Louisiana, designed by Brennan Smith, Viking Fast Craft, Catalina Adventure - Aluminum Hull Foil design by Prof. KG Hoppe. See the following website: www.vikingfastcraft.com/149%20Passenger%20Ferry.html

Both are HYSUCAT - Hydrofoil Supported Catamaran Foil systems developed at Stellenbosch University by Prof. KG Hoppe. These designs were chosen because of their impressive fuel savings, smooth ride characteristics in the choppy seas off California.

Gerhard Kutt
www.hawctech.com

A 70 passenger foil assisted catamaran has been operating on the Tennessee River since May 2008. It is owned by the Tennessee Aquarium and runs multiple trips daily to the Tennessee River Gorge. For further info, see Tennessee Aquarium web site.

Jack McDonald

Above: *River Gorge Explorer* a 65' Teknicraft-designed Catamaran Tour Vessel at the Tennessee Aquarium in Chattanooga TN

The vessel seats 70 passengers and is able to whisk them through the Tennessee Gorge at 50 mph. The lifting effect produced by the Teknicraft hydrofoil and signature hull shape causes the vessel to draft less than a foot of water as the vessel cruises its 24 mile route up and down the river. Power for the craft is supplied by four C-18 ACERT engines with 875 bhp at 2200 rpm and propulsion is supplied by four Hamilton Jet HJ 403 water jets.

Length at the waterline is 58'-9". Beam is 23'-6". Surveyed to USCG Subchapter T. Crew of Three. Builder is All American Marine, Inc.

Supercomet Model

I have recently purchased a Super Comet or PT50 and have learned that an article was written about it in *Model Boat Magazine*. Does anyone have that particular magazine and if so could I get a copy of the article?

Don Lund

Above: *Super Comet* Model Assembled By Matthias Rom

Response…

I have two Super Comets. I just recently built one. The other is still in the box. I put a brushless motor in the Comet and she flies!

I do not recall any articles on the Super Comet , but I will take a look and get back to you .

I also have a 32nd parallel VS-8 hydrofoil for this winter's project.

Stephen McDonald

Continued on Next Page

Letters to the Editor
(Continued From Previous Page)

Volga 70 Line Drawings ???

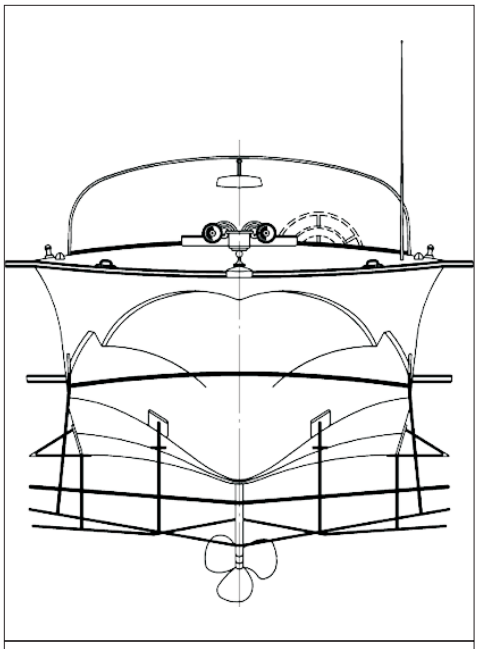
I am an IHS member, and am very close to finishing the restoration/radical modernization of my Volga. All of the mechanical work has been completed, and I am about to begin the paint/interior.

It has the potential to be pretty amazing, and I want it to resemble my aerobatic biplane and Russian Fighter. For my designers to do their best work, I need a line drawing to use as an underlay. Any leads would be welcomed.

I saw the picture of Regimantas Sermontis' boat in the Photo Gallery of the IHS website. This boat captures the look I am going for. I would love to get some more pictures, as well as to communicate directly with the owner or workmen who did the work.

Any help would be welcomed as we are down to the final steps of paint and interior.

Adam Grosser



(Above) Volga 70 Front View by Scott Smith

Response…

Congrats on the Volga, wish I were in your position... I have been talking to Maurits Schornagel, who has a web site with scans of an original Volga blueprint, right up your alley. Unfortunately the originals were pretty old and dark, but they might do the trick. The web site is www.volga-hydrofoil.net/blueprints/Scans/ .

I am converting the scans to vector drawings (CAD), but haven't finished yet. Since I am doing it in my spare time it may be weeks before I finish. I currently have the front view complete, side view 75% completed. I haven't started on the top view. It is time consuming because I am correcting distortions caused by knitting together many smaller scans and the print's being originally drawn on a manual drafting table, not to mention folds and tears on the original. I am spoiled by the accuracy of CAD.

I can send you what I have done already, if you tell me what file format you prefer. Image formats like JPEG are possible, but not very high resolution. Vector formats would be better, such as DWG, but PDF works also if you can use it.

Scott Smith

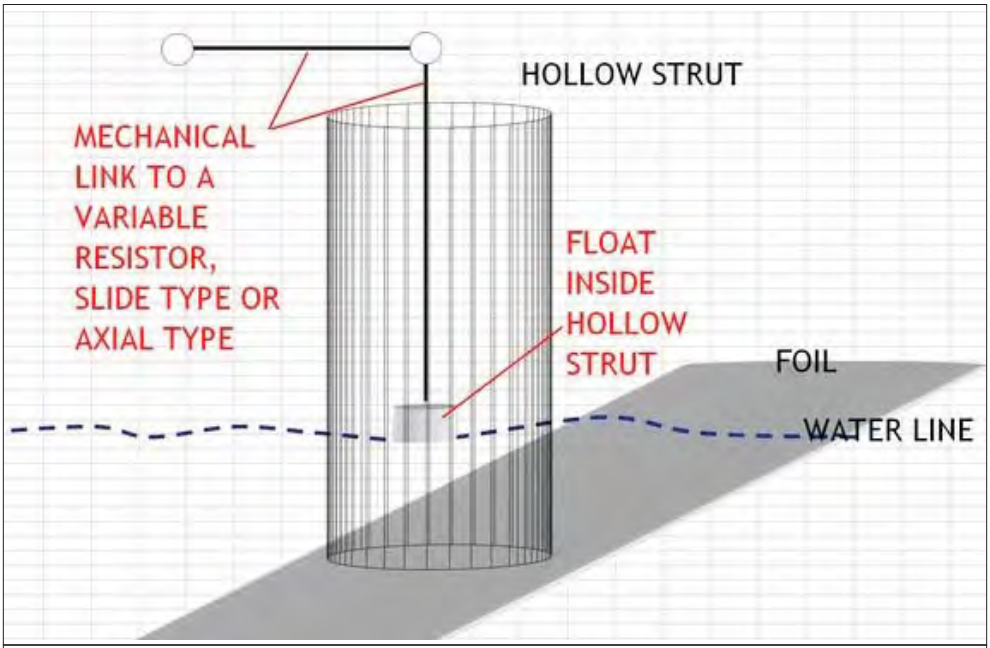
Height Control Sensors

Has anyone tried implementing ultrasonic sensors for height control? If so could anyone let me know how they went about doing it? Sensor model, cost, calibration etc.?

Timothy

Continued on Next Page

(Below)"Pimp My Ride!" Regimantas Sermontis, from Klaipeda, Lithuania refurbished his Volga 70 in the summer of 2007. He has installed a 6.0 litre Crusader 375 bhp engine.



(Above) Height Sensor Concept by Lam Yet Fat

Letters to the Editor
(Continued From Previous Page)

Responses…

I have under development a digital roll and height control system replacement for *Talaria*'s analog control system.

I am experimenting with the EZ20 from www.maxbotix.com/. It was chosen for its wide angle beam, useful for a platform such as *Talaria* that banks up to 35 degrees. The EZ20 is not water proof. If a narrow angle sensor is adequate, there are many available.

Harry Larsen

Below: Harry Larsen's *Talaria*

Have you considered using a float switch? I do not draw too well, but hope you can understand my sketch (above). Switch is just for 2 status control, if the float is linked to a variable resistor, it can probably give a good feed back control.

Lam Yet Fu

I don't think your concept will work very well by itself. A feedback sensor needs to operate with as little delay as possible, or it will destabilize the closed loop system. In your concept, there will be a lag as water flows in and out of the strut. This will attenuate the wave height as they go by and will respond slowly, depending on how large the opening is to the strut. A large opening can have significant hydro-dynamic drag.

Another factor is the pressure at the location where the water flows in and out of the strut. If the port is located at a low pressure region, the water level in the strut will be less than the water level outside. And if it is located in a region of higher pressure, the water level will be artificially high. To some extent, these differences can be compensated for by calibration. But they will change with speed. If you're clever about the port placement, you might be able to exploit that fact if you want the flying height to vary with speed.

Such a sensor may work in conjunction with other sensors that have better dynamic response if you wanted an input that would average the waves and the flying height. But I think you'll find it has lots of issues if it is the only height sensor.

Tom Speer

Bentley Marine

Kudos to John F. Rodrigues and Bentley Marine for the webpage "Advanced High Seakeeping Hulls," URL: http://bentley-marine.com/Advanced_Hulls.htm. It is well worth a browse; see example photos below.

Barney C. Black

Above: 132'A-Foil Catamaran Ferry; 55 knots cruising speed

Below: Monohull With A-Foil