THE NEWSLETTER

INTERNATIONAL HYDROFOIL SOCIETY

Post Office Box 51, Cabin John, Maryland 20818, USA

Editor: Robert J. Johnston | SPRING 1994 | Co-Editor: John R. Meyer

IN THIS ISSUE.....

MEETING ANNOUNCEMENT

JOINT MEETING OF IHS, SNAME SD-5 PANEL, AND U.S. HOVERCRAFT SOCIETY
APRIL 29, 1994
FORT MYER OFFICERS CLUB, ARLINGTON, VIRGINIA
CAMPAIGN ROOM

5:30 PM Cash Bar - 7:00 PM Dinner - 8:15 PM Program; $19.00 Per Person
Menu- Soup, Choice of Beef Stroganoff or Red Snapper, Vegetables, Dessert, Coffee
Make reservations and choice of menu no later than April 26 if you plan to attend. Call one of the following:
John R. Meyer 301-227-1796; Patsy Jackson 703-329-0102

PROGRAM

"ASSESSMENT OF FERRIES AS AN ALTERNATIVE TO LAND-BASED TRANSPORTATION"
Martin C. Pilsch, Manager Special Projects
Urban Harbors Institute, University of Massachusetts, Boston, Mass.

1994 DUES REMINDER

ALL MEMBERS ARE NOTIFIED THAT DUES FOR 1994
ARE TO BE PAID
Please send your $20.00 check made out to IHS to:
CAPT. John W. King, USN (Ret.)
4313 Granada Street
Alexandria, VA 22309 USA

THE PRESIDENT'S COLUMN

From time to time the IHS has invited members of the U.S. Hovercraft Society to our meetings and likewise the USHS has done the same. But as you can see from the meeting announcement on the cover page, for the first time, a joint meeting is formally planned by the two Societies and the SNAME Ship Design Panel (SD-5) for High Performance Ships and Craft. Over the past year a common interest has developed in all three organizations, namely, the promotion of fast ferries, particularly in the U.S. The SD-5 Panel is, in part, dedicated to development of the science and engineering of ships and craft offering capabilities not available in conventional types. One of the committees, AMV Information Presentations, headed by Bill Rogalski, is preparing a "White Paper" entitled: "The Potential Role of Advanced Marine Vehicles in the U.S. Transportation Infrastructure".

The IHS has recently extended the Congressional Liaison Committee's activities to develop a strategy and plan to educate U.S. legislators regarding the potential of HPMVs in the U.S. Cam Mixon heads up this Committee and is supported by Jim King, John Monk, and Mark Rice. The long range objective is to introduce legislation which would result in appropriation of Federal funds to demonstrate HPMV routes as part of intermodal transportation systems. This would serve as a showcase for establishing other promising fast ferry routes in and around the U.S. The speakers at our last several dinner meetings have addressed the issues of "Intermodal Transportation" and how fast ferries have been successful in many parts of the world. We are continuing this theme with Martin C. Pilsch who will be the speaker at the April 29 joint meeting.

The articles in this and other Newsletter issues attest to the accomplishments of HPMVs and hydrofoils with the encouraging developments in Norway and Japan, along with the new Olympia and Cyclone fast ferries by the Feodosia Shipyard in the Ukraine. Added to these events are the fascinating developments in Japan of the much publicized Techno-Superliner project. The IHS compliments the many organizations in Italy, Japan, Norway and the Ukraine for their vision and creativity. I am sure there are many IHS members worldwide who wish they were "in the thick of it".

In closing this column, I want to make two pleas. One is for news about our members. We would appreciate even short letters that we can share with our fellow members. Please let us hear from you since we want to include personal notes and your activities in the Newsletter to enhance its human interest side. The second is to emphasize the need for financial support of your Society. We have not followed the practice of sending out separate, formal invoices for annual dues. The call for dues and follow-up reminders have been included in the quarterly Newsletters. This saves considerable postage - which has become a major expense. Your Board of Directors therefore requests that each of you retain or reinstate your "in-good-standing" status as soon as possible. *John R. Meyer, President*

30 YEARS AGO

(Fast Ferry International issues sometimes include articles of historic interest. Here are several items dating back 30 years republished in November 1993.)

In the news section came a report of the first large Hungarian hydrofoil. Due to be launched in the early spring of 1964, the Feckske was being built by the Magyar Hajo-Es Darogyar yard. "Employing shallow draught submerged foils, it has been designed for inland waterways, particularly rivers, and will seat fifty to sixty passengers."

And in Canada; "Construction of the de Havilland Aircraft of Canada FHE 400 hydrofoil is now underway at the company's plant at Malton, Ontario. De Havilland was awarded a $9.1 million contract for the design and production of the craft by the Royal Canadian Navy, who will use it to determine the suitability of hydrofoils for anti-submarine warfare at speeds in excess of 50 knots. The craft is expected to be completed by mid-1965."

Meanwhile the use of hydrofoils in the USA was being promoted by none other than the government. "US Maritime Administration's experimental hydrofoil, the HS Denison, is at present touring the major sea coast towns along the Atlantic and Gulf coasts of the United States, demonstrating the flexibility of hydrofoil ships to the marine industry.

"James A. Higgins, who has been largely responsible for hydrofoil programmes at the Maritime Administration for several years, states that the Denison program has been highly satisfying.

"The Maritime Administration believes that a hydrofoil industry in the US has been successfully initiated through the initiative of the industry and the government working together to produce the Denison."

GARRETT M. DYER

IHS regrets to report that Garrett "Gary" M. Dyer, 63, died last October at his home in Seattle. Thanks to Sumi Arima, your editors were informed of this at the time, but were remiss in including the notice in the Winter 1993 Newsletter.

Born July 25, 1930, in Seattle, Gary graduated from Overlake High School and attended Gonzaga, Seattle and George Washington Universities. He joined the U.S. Navy and became an aviator, retiring after 20 years with the rank of commander. He was one of the pioneer test pilots in the Navy, and subsequently contibuted to Lockheed, Boeing, and Grumman hydrofoil programs. Gary started in the hydrofoil world as captain of AGEH PLAINVIEW while undergoing builders trials and preliminary acceptance trials at Lockheed. He rejoined the Navy as LCDR and was the Hydrofoil Program Officer under Bill Ellsworth. When Gary got out of the Navy, he worked for Boeing as Captain on their Jetfoils.

Gary had a great interest in photography and guns and was respected for his talents in both. His survivors include his son, Robert M. Dyer of Bellingham; a brother, Peter S. Dyer of Bellevue; a niece, Elizabeth Dyer of Seattle; and nephew, Charles Dyer of Bellevue.

THE SECOND INTERNATIONAL CONFERENCE ON FAST SEA TRANSPORTATION, "FAST'93"

(Dr. Yong S. Park, Associate Director, Systems Technology, Office of naval Research, Asia, summarized this conference in a communication to Navy personnel. It is reproduced, in part, here for the benefit of IHS members.)

The Second International Conference on Fast Sea Transportation, "FAST'93", was held on 13-16 December 1993 in Yokohama, Japan. It was organized by the Society of Naval Architects of Japan and sponsored by the Ministry of Transportation, the Japan Shipbuilding Industry Foundation, and the City of Yokohama.

Dr. Kazuo Sugai, chairman of the organizing committee, proclaimed that the FAST'93 aimed at helping to shape the future course of the design and operation of high-speed marine vessels by providing a forum for international cooperation and exchange of information.

The conference attracted more than 400 participants from 21 countries (232 from Japan, 33 from Korea, 29 from U.S., and the rest mostly from Europe and Australia). The proceedings were divided into 33 technical sessions, in which a total of 142 papers were presented, and one Plenary Session, at which 5 special talks on general topics were presented. The major subjects of the technical sessions were Project Concepts, Fluid-Dynamics, Structure, Control Systems, Hydrofoils, Catamarans, SWATH, SES, WIG, Machinery, Numerical Simulations, Design Problems, Economy, Safety, Operations, Propellers/Propulsors, and Regulations.

In parallel to the conference sessions, there was a technical exhibition, which displayed models, prototypes, posters, or video showing the state-of-the-art high-speed surface vehicles, machinery, and instruments by about 30 shipbuilding and engineering industries (mostly from Japan).

The most comprehensive summary of the whole proceeding was presented by Mr. Philip C. Hercus, president, International Catamaran Designs, Australia. In the following summary, highlights from this talk, along with my personal observations are presented.

"Fast Sea Transportation in the 21st Century", by Philip C. Hercus: As the 21st Century approaches, the sea transport industry lies somewhat in disarray due to excessive competition, resulting in many substandard ships and practices, which calls for a clear direction.

Passenger ferries:

In 60s & 70s, technologies for small passenger ferries were concentrated on hydrofoils and air-cushioned vehicles(ACVs) such as hovercraft and surface effect ships (SESs). In 80s, fast catamarans were developed and achieved much greater market acceptance than others. Today, most of the new fast passenger ferries being built are catamarans. There is a large market for ferries that can carry 300-400 passengers at speeds of about 35 knots but recent vessels are capable of 40-50 knots.

Fast Car Ferries:

The fast passenger vessel technologies are now being applied to larger fast car ferries. A small number of these were built in the last 20 years. In 1990s, however, more ships are being built and the majority have been "Wave Piercers" but there are also fast catamarans and monohulls. There are various types of these vessels based on the variety of technologies. The wide range in types and sizes is a clear indication that the industry is a long way from maturity, which is further demonstrated by significant variations in selection of hull materials, propulsion machinery, etc. Technologies are being developed and improved dramatically, which enable new designs capable of 55-60 knots. It is too early to accurately predict the design types and features that will predominate but the proponents of Wave Piercers and other types of fast catamarans are very confident.

Fast Freight Vessels:

With the establishment of the viability of fast car ferries, there are clear possibilities to adapt their technologies to fast freight vessels, which is lead by the Australian shipbuilding industry. At the same time, Japan initiated a new development program, Techno-Superliner (TSL), which aims at developing a vessel capable of carrying 1000 tons of cargo at 50 knots over a distance of 500 miles. The immediate challenge lies in proving commercial viability of fast freight vessels. The needs for fast sea transportation arise from: air alternative, transportation efficiency, and road traffic relief.

Vessel Types:

Trend for the 21st century vessel technology is simplicity. Within the simple technologies, however, the choice between catamaran and mono-hull designs is much closer. Clearly, the mono-hull has a simpler structure, but must be extremely slender if its resistance is to approach that of a catamaran, causing stability problems.

Wing-in-Ground Effect Vehicles (WIGs):

The benefits of the WIG principle have been recognized for many years, but have not generally been exploited, except in the former Soviet Union where they have been called **EKRANOPLANS**. However, these vehicles were produced essentially for military purposes. "In practice, WIGS (also called Wingships) in their current configurations are considered aircraft."

Materials:

The dominant material used in fast vessels today is aluminum. There are also some FRP vessels, but the question of toxic emission in the event of fire has to be satisfied. High-strength steel also receives some limited support based on its superior fire performance to aluminum, but aluminum is expected to predominate in the immediate future.

Summary:

Fast sea transportation has developed rapidly in the last decade of the 20th century. It is a very young industry which has yet to develop any strong patterns but it is an industry with enormous potential. As we move into the 21st century, there will be continued growth in size and speed of fast ships. This allows further refinement of fast vehicle ferries and the size increase will facilitate the development of fast freight ships.

Observations are summarized as follows:

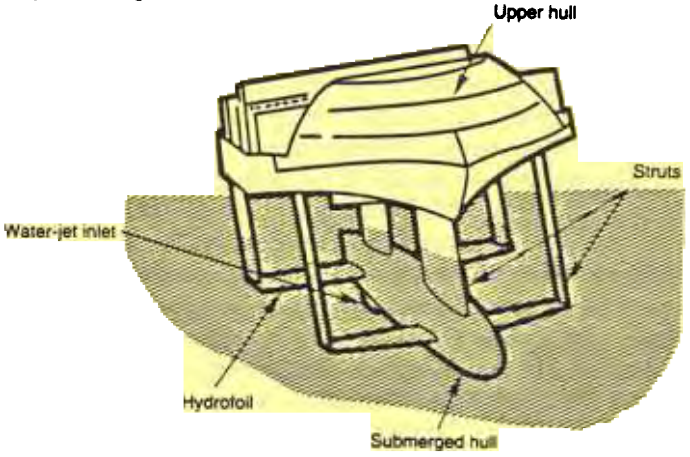
1. Catamarans definitely appear as the wave of the future of the high-speed surface vehicles not only for the passenger ferry but also for the fast car and perhaps for cargo ferry service.
2. Currently, the cargo ferry industry is led by Australia, but Japan is poised to take the market away from Australia by initiating an ambitious national program to develop and build in a few years a super-high speed, Techno-Superliner, capable of carrying 1,000 tons of cargo at 50 knots over distances of more than 500 nm, by a consortium of Industry giants.
3. The technology trend for the 21st century fast vessels appear to be moving towards for simplicity and safety. Catamaran enjoys both the simplicity and stability.
4. An impressive talk and slide show was presented by a Russian scientist on the history of evolution of development and tests of the Russian version of the WIG vehicle. The question is who will use these costly aircraft-like monster vehicles now that the Soviet military is gone, for which the vehicle was originally designed and intended.
5. China displayed impressive arrays of catamaran fleets that are already in operation as cruise ships and cargo ships on major rivers. They even showed a plan to develop and build long-range catamarans to provide ferry service to Taiwan!
6. Many Japanese catamarans and its variations such as "Super-catamaran", "Wave Piercer" and "Jetfoil", are being developed and built by its heavy industries under the license agreements with the western nations including U.S., Australia and Sweden with the Japanese state-of-the-art technologies incorporated.
7. Just about every shipbuilding country in the world nowadays seems to be engaged in research, design, construction of some kinds of catamarans. The few U.S. companies who participated in the Exhibition, however, focused only on advertising machinery, especially main engines for Japanese catamarans. A Navy participant told me that currently the Navy is not interested in owning or building fast surface vehicles. This is puzzling to me at least because the Navy "From-The-Sea" doctrine places a heavy emphasis on providing support for littoral warfare in the future regional conflicts. It seems that the fast surface vehicle technologies that were displayed or demonstrated at this conference or similar ones should be exploited or directly applied to the naval support ships to enhance their effectiveness in amphibious operations or theater missile defense operations by providing quick transport support for landing Marines or evacuating U.S. citizens from regions of crises.

TECHNO-SUPERLINER PROJECT UPDATE

By John R. Meyer

During FAST '93 there were a total of 20 papers related to hydrofoils. Six of these were related to "conventional" hydrofoils, 6 to foil-assisted catamarans, 5 to "Foilcats", and 3 specifically on the Techno-Superliner Foil (TSL-F) Hybrid. The latter three papers are briefly summarized here as a way of updating our members on this strongly supported project in Japan.

1. "A Submerged Hull and Foil Hybrid Super-High Speed Liner" by Ryotaro Ogiwara, Kawasaki Heavy Industries,Ltd.; Naoki Yamanaka, Kawasaki Heavy Industries,Ltd.; Kentaro Kobayashi, Sumitomo Heavy Industries,Ltd.; and Atsuo Moriyama, NKK Corporation, Japan. This paper described the novel super-high speed ocean liner, the TSL-F, which utilizes a fully submerged hull and fully-submerged foils to support its entire load, currently under development as the Techno-Superliner Project in Japan.



The major components of the TSL-F are a) An upper hull, b) A fully submerged lower hull, c) Fully submerged foils, and d) Struts, as shown here.

The Techno-Superliner Project goals are to achieve the following performance characteristics: a) Ship speed: 50 knots; b) Payload: about 1,000 metric tons; c) Endurance range: more than 500 nautical miles; and d) Seaworthiness: regular service in Sea State 6. It was mentioned that the goals of this project are not limited to these specifics, but their fulfillment is essential to the concept of a super-high speed ocean liner which must provide punctual service and a high operational rate year round.

The authors stated that the latest results of the hydrodynamically oriented research and development on the TSL-F project have proved its "fitness" as a solution in pursuit of a super-high speed and seaworthy ocean liner. The TSL-F exhibits extremely excellent seaworthiness, with almost no speed reduction or undue motion in high sea state operation. The seaworthiness of the TSL-F has been analysed and examined with various model experiments to measure hydrodynamic characteristics, in particular, added wave resistance and motion in waves, using a captured model and/or free model with an automatic motion control system.

2. "The Real-Time Simulation to Verify the Automatic Control System for a Submerged Hull and Foil Hybrid Super-High-Speed Liner", by Toshiyuki Itoko, and Masanori Hamamatsu, System Technology Development Center, Japan, Kawasaki Heavy Industries, Ltd.; Yoshio Yamagami and Tetsuro Ikebuchi, Central Technical Office, Ship Group, Kawasaki Heavy Industries, Ltd. The authors

stated that they have been studying an automatic control system for a submerged hull and foil hybrid super high-speed liner as part of the R&D program for the Techno-Superliner (TSL). For reliability of the automatic control system, they have developed a highly redundant control system. To verify the various functions of the duplex computer system developed and to evaluate the performance of the vessel investigated with the practical redundant automatic control system, a real-time simulator has been developed. Various tests have been carried out to validate the automatic control system under many conditions. The results obtained have verified the validity of the control system.

To maintain a high-speed vessel's safety, the automatic control system developed employs a configuration composed of a duplex computer and an automatic emergency landing system, which allows safe landings when the altitude control does not function, for example, in case both computers fail. Accordingly, they have adopted a highly redundant system which has redundant sensors, a duplex digital computer system, redundant control surfaces, and twin-actuator systems. The paper introduces the real-time simulator developed and describes some simulation results obtained.

3. "Structural Analysis of a Submerged Hull and Foil Hybrid Super-High Speed Liner" by Isao Neki, Akitoshi Ando, and Hideo Manabe, Ishikawajima-Harima Heavy Industries Co.,Ltd.; Kiyotaka Uno, NKK Corporation; and Hironori Sugimoto, Kawasaki Heavy Industries Co., Ltd. A submerged-hull and foil hybrid super-high speed liner (TSL-F), has a unique structural configuration. To obtain structural response characteristics of such a hybrid hull form in waves, it is unsuitable to analyze the longitudinal and transverse strengths individually and to subject it to decided design loads like a conventional ship. To obtain structural response characteristics, whole-ship three-dimensional finite element method (3-D FEM) analysis in various wave conditions was carried out.

The paper outlined the results of research on structural response analysis and reliability analysis in wave conditions, extracted from structural strength studies for TSL-F. The authors described a procedure for the structural response analysis and the reliability analysis in the development of TSL-F. First, the dynamic pressures and dynamic forces acting on the ship were calculated in regular waves with various wave lengths and headings. Second, using the structural response analysis system, the structural response characteristics in regular waves (stress response amplitude operators) for the target structural members were obtained. A whole-ship 3-D FEM model for this analysis was subjected to hydrodynamic loads.

Next, long-term prediction for the stress response of target structural members in irregular waves was calculated from the sea conditions of the "design route", the operating conditions, and stress response amplitude operators, using the structural reliability-analysis system. Finally, the probability of failure and the safety index of each structural member corresponding to the failure mode, such as fatigue, yield, and buckling were calculated using the structural reliability analysis system. As a result of this strength evaluation, scantlings of insufficient strength and over-strength members were adjusted to optimize hull weight and safety of the structure.

Hydrodynamic forces in waves, the characteristic of structural response in waves and reliability-based strength evaluation were obtained using the three systems: the analysis system of hydrodynamic forces, the structural response analysis system, and the structural reliability analysis system, developed during the R&D of TSL-F. Hull weight and safety of the structure were optimized and a construction design for the TSL-F was completed.

FAR EAST HYDROFOIL ORDERS TWO FJELLSTRAND FOILCATS

(From Fast Ferry International, December 1993)

Kvaerner Fjellstrand confirmed at the end of November that Far East Hydrofoil had ordered two FoilCat "foil assisted catamarans" for its Hong Kong-Macao route.

Like the FoilCat 40m prototype launched two years ago, the new 407 seat vessels will be powered by a pair of General Electric LM 500 gas turbines rated at 4,474 KW at 7,000 rpm, supplied by Kvaerner Energy.

The contract is, Kvaerner reports, "worth US$40 million" and both vessels are to be built at the Kvaerner Fjellstrand yard in Omastrand. No other technical details about the production FoilCat or the delivery dates of the two vessels have yet been released by the company.

Commenting on the contract, Bent Hammel, the head of Kvaerner Fast Ferries, said, "This order represents a technological and marketing breakthrough. It means we have commercialized one of Kvaemer's biggest development projects." [EDITOR'S NOTE: This FoilCat is 100% supported by foil dynamic lift in the cruise mode.]

FOIL-ASSISTED CATAMARAN COMPLETED IN SOUTH AFRICA

(From Fast Ferry International, November 1993)

The first 22.5m Sea Shuttle has recently been completed and is currently undergoing sea trials in South Africa. The craft, built by M.K. Sea Transportation International of Cape Town, is a foil-assisted catamaran which has been developed, the company reports, as a low capital cost, low running cost vessel.

The asymmetric hulls are fitted with fixed foils. The main one, manufactured from corrosion resistant steel, gives a lift of approximately 22,000 kg while two stabilizing foils at the stern provide a further 1,000 kg each.

The positioning of the foils is designed to maintain a water depth of approximately 200mm above them at service speed. The reduction in drag induced by the foils is, says M.K. Sea Transportation International, in excess of 35%.

The trials vessel, constructed in glass reinforced polyester with structural PVC foam, is fitted out to carry 117 passengers at a service speed of 30 knots. Further development work by the company includes versions to be produced in aluminium.

THE GORDON BAKER STORY

By Bob Johnston

One of the outstanding contributors to the modern era of hydrofoil development was Gordon Baker. Gordon became involved with hydrofoils in the late 1940s and played an active role, particularly with the U. S. Navy's program, until his untimely death. Gordon was a strong mathematician who as a member of the Office of Scientific Research and Development during World War II worked primarily on fire control systems. After WW II he joined Professor DenHartog at the Westinghouse Corporation as a vibration specialist. He did trouble shooting for Westinghouse on rotating machinery all over the world.

Gordon's grandfather founded the Baker Manufacturing Company in Evansville, Wisconsin, a producer of windmills widely known throughout the farming community. Gordon's father while a student at the University of Wisconsin wrote a thesis on the subject of profit sharing as an employee incentive. The heart of this plan was the distribution of stock to employees based on longevity and salary. Upon Gordon's father's graduation he joined the family company and convinced his father to introduce this incentive system in the Baker Manufacturing Co. The problem with the plan was that it was too generous as far as the Baker family was concerned. By the time Gordon's father retired from the company there were employees who owned more stock than members of the Baker family. Gordon's older brother took over as the President of the company but his heart wasn't in it and the company began to deteriorate. Gordon became concerned about his mother who depended solely on an income from the profits of the Baker Company. To salvage the situation Gordon gave up his position at Westinghouse and became the head of Baker Manufacturing Company in the late 1940s.

Gordon recognized that with the spread of rural electrification, windmills were not a very popular item and so he turned to producing and manufacturing rural water systems along with establishing warehouses for the distribution and sale of these systems. These and other of his efforts brought the company back into a profitable position.

Producing water systems did not have the technical challenge that Gordon had previously experienced. He therefore sought other products that could provide that challenge. While he was with Westinghouse a fellow engineer was a German by the name of Tietjens. Engineers will probably remember studying Tietjens' "Strength of Materials". While Tietjens was with Westinghouse he had experimented with hydrofoils, actually testing a small runabout on the Philadelphia River. This was in the 1930s when Gordon was a junior engineer at Westinghouse. As the German war effort grew, Tietjens returned to his native land to assist. He designed and built the VS-7 to compete with a Schertel's VS-8 for a production contract to build a hydrofoil mine-layer. Baron von Schertel and the shipbuilder, Sachsenberg, were the winners of the competition and Tietjens faded from the hydrofoil scene. Based on his experience with Tietjens, Gordon Baker decided that the construction of a low cost, hydrofoil run-about could find a place in the U.S. market. Also the design and testing of a simple to operate craft while keeping costs low gave Gordon the technical challenge that had been missing in his life. The basic concept that he started evaluating was the use of a constant section V-shaped foil that could be extruded. Undertaking test work with the University of Minnesota he perfected a foil that met his desired requirements. During this period he studied conventional, canard, and tandem foil arrangements. For the production model he selected the canard arrangement because of its ability to be steered forward. As he took his runabout to boat shows and other display opportunities, He found tremendous interest but sales were limited and disappointing. Baker Manufacturing continued to produce these craft for a number of years but the sales appeared to be fixed at a low number per year no matter the effort placed into expanding sales; Figure 1.

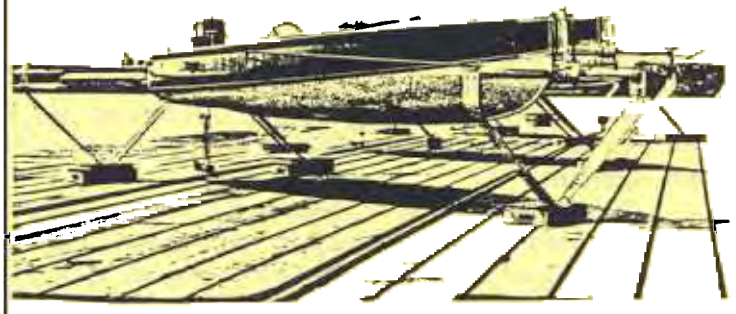


Figure 1 - Runabout

During this period Gordon Baker became aware of the U.S. Navy's interest in hydrofoils. He came forward and reviewed his experiences in designing and testing his production model run-about. He then proposed to continue his testing of constant section V-shaped surface-piercing foils and to build a larger model craft with steerable, in-banking foils. The control system was to be completely mechanical. The Navy considered this to fit in with their ongoing hydrofoil development program and a contract was awarded to design and build the craft HIGH POCKETS; see Figure 2.

Figure 2 - HIGH POCKETS

HIGH POCKETS, when delivered, proved to be a very interesting craft. For the first time the Navy had a test vehicle in which passengers could be carried and that could demonstrate some of the desirable characteristics of hydrofoils. The steering and differential changes in the angles of attack of the inboard and outboard foils were controlled by a mechanical computer during turning maneuvers. As a result, this 24-foot craft helped increase interest in the Navy's program. It also gave the first hydrofoil ride ever taken by a U.S. Navy Chief of Naval Operations when Admiral Carney made a round trip from the Pentagon to the Anacostia Naval Air Station (see the IHS Newsletter, Spring 1990).

While Baker was working on his runabout, his sailing enthusiasm carried over into the development of a hydrofoil sailboat. His first craft was a cat boat using similar foils to the runabout. He used a conventional arrangement with the aft foil used as the rudder. The sailboat was quite thrilling to sail being fast enough to pass a number of power boats. The problems were that to come about the boat came in irons and would stall out, also when running before the wind the craft had a tendency to pitch pole. Gordon then made the decision to build a larger craft with features which would overcome these problems. These efforts were using venture capital of the Baker Company as the ultimate aim was to find a marketable product.

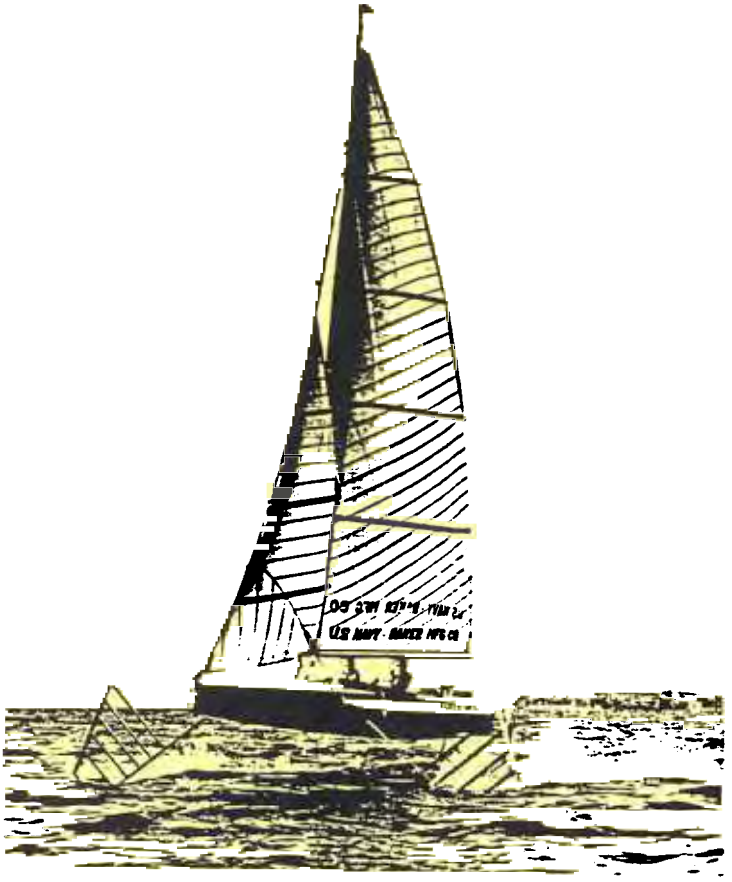


Figure 3 - MONITOR

Gordon approached the Navy seeking financial assistance in the sailboat venture. The Navy had no interest in hydrofoil sailboats but was interested in exploring various types of foil systems. One system was the use of ladder foils as used on the old Bell boat and were also being investigated by the Canadian Navy. The problem with ladder foils was to hold the tolerances during the fabrication process. The Navy made an arrangement to support the fabrication of the foil system if Baker agreed to complete the rest of the boat. Baker's initial design was to use two fixed, aluminum sails to achieve a bi-plane effect. His design goal was in the 40 to 50 knot speed range. Another feature of the craft was a mechanical computer which sensed the forces from each stay. The computer then calculated the desired angle of attack of the rear foil to prevent the previously experienced pitch poling on the smaller sailboat. The controlled rear foil was V-shaped foil similar to that used on his runabout. The conventional arrangement included two ladder foils forward that were fixed.

As this sailboat project developed, financing by the Baker Company became a problem. After building the first fixed sail the costs ran so high that the decision was made to go to cloth sails in a sloop rig. Otherwise the design changed very little from concept to completion. Figure 3 shows the finished sailboat, MONITOR, underway and achieving a measured speed of 45 knots. The previous problems with stalling and pitch poling had been eliminated. However the marketing results were again a disappointment to the Company. Sales never developed to the extent that warranted going into production.

Now the lack of stock control and the failure of the runabout and the sailboat to be profitable began to cause problems for Gordon Baker's position as head of the company. Added to this was the fact that Gordon had given up a consulting assignment from the Westinghouse nuclear program when he became heavily involved with the hydrofoil effort. Westinghouse paid considerably more per hour for Gordon's services than the Navy which was of direct benefit to the Baker Company. Based on these considerations a stockholders meeting was called with the objective of getting rid of Gordon. The Navy, not wanting to lose Gordon's hydrofoil expertise, sent a representative to the meeting. That representative was LCDR. Robert Apple, USN. Bob's talk to the stockholders was so well received when he talked of Gordon's contribution and patriotism to the Navy's program that when Gordon agreed to give up the company's commercial hydrofoil program, his position was saved.

Gordon went on supporting the Navy's hydrofoil program for a number of years. When the Navy's interest became focused on the landing craft goal of increasing the speed of these vehicles, Gordon again made major contributions. The Navy's interest was now directed more at submerged foil with automatic control systems. To explore the use of mechanical control systems the Navy entered into a contract with the Baker Manufacturing Company. The result was the production of HIGH TAIL, a 24-foot

craft with three controllable and retractable V-foils. Three sensing arms were in contact with the water and provided the input to the computer for control; see Figure 4.

Figure 4 - HIGH TAIL

Baker Manufacturing also designed and built a full scale LCVP(H), HIGHLANDER; see Figure 5. This craft was a larger version of the successful HIGH POCKETS. As electronic control systems became the preferred mode of control, no further use was made of Gordon's mechanical-control expertise, although many of his control techniques were incorporated in the electronic systems that followed.

Figure 5 - HIGHLANDER

Gordon's interests in life were wide and varied. At one time he developed a mathematical model of the U.S. economic system based on vibration theory. The theory was based on using commercial discounting to control the up and down swings. Controlling positive discounting was used to stimulate the economy during periods of recession. During periods of inflation, controlled negative discounting would dampen the upswing. His arguments were mathematically and logically convincing. The big advantage that Gordon liked best was the fact this could be done by the private sector using the Chamber of Commerce or the Manufactures Association as the stimulating organization, but not involving the government. Gordon wrote a paper on the subject and presented it to a number of recognized economists, the University of Chicago's Economic Department, and at a National Convention of Economists. He never once had a comment if it might work, if it wouldn't work or where it might be flawed. Perhaps the economists didn't understand the idea but the concept is intriguing.

Author's footnote: In my professional experience I have known and worked with three technical geniuses. Gordon Baker was one of them. I marveled at his ability to turn complex mathematical equations into mechanical devices. This was demonstrated in the fire control systems he designed and the hydrofoils he built. In spite of his stockholder troubles he was an effective manager. After his arrival as the head of the company and even though he invested heavily in the hydrofoil concept he yearly made a substantial profit for the company. Gordon was also a delight to know. I treasure the times we spent together. While in the Navy, after the days work was over, we would retreat to his house and engage in a ping pong match to see who would buy the dinner. After going to Miami Shipbuilding, the Baker Company used our facilities as their winter test site. We continued our close relationship and ping pong contests. It was with great regret that I learned of his passing. I'm sure you would agree, he would have made a great member of IHS.

FERRY TERMINAL WITH HELIPORT OPENED ON MACAO

(From New York Times, January 30, 1994)

A new ferry terminal has opened on Macao, the Portuguese territory 40 miles from Hong Kong. The three-story terminal is equipped with piers for high-speed ferries, Jetfoils and catamarans and has a heliport on its roof for scheduled service by East Asia Airlines, which has flights between Macao and Hong Kong in addition to Canton and Shenzen in China.

The ferry terminal, which can accommodate up to 30 million passengers a year, features separate arrival and departure levels with elevators, escalators and moving walkways to handle visitor and shipping traffic. Tour companies and shipping services have offices in the building. Other facilities for passengers include restaurants, shops, an underground garage and 14 lounges, which have direct access to the piers.

A one-way trip from Macao to Hong Kong ranges from 55 minutes by Jetfoil to 90 minutes by catamarans. Macao, a 6.1-square mile island, which will revert to Chinese control in 1999, two years after Hong Kong, is building an international airport scheduled to open in 1995.

HITACHI DELIVERS SUPERJET-30 FOIL-ASSISTED CATAMARANS

(From Fast Ferry International, January-February 1994)

No fewer than four of Hitachi Zosen's new Superjet-30 foil assisted catamarans entered service in Japan towards the end of 1993.

The first vessel *Trident Ace* was completed at the company's Kanagawa yard in September and introduced

on November 10, along with *Artemis.* the third Superjet-30 launched, on Fuke Kaiun's route across Osaka Bay between Fuke and Sumoto, Awajishima.

However, both vessels will be transferred to a route serving the new Kansai International airport when this opens later this year.

The second and fourth Superjet-30s built, *Zuiko* and *Dogo,* entered service with Ishizaki Kisen and Setonaikai Kisen respectively on December 25 on the Hiroshima-Matsuyama route jointly operated by the two companies.

Although there had been no fast ferry activity at Hitachi Zosen for ten years until the Superjet-30 program got underway in 1992, the company pioneered the use of hydrofoils in Japan and built 52 PT.20s and PT.50s under license from Supramar between 1960 and 1983.

No hydrofoils have been produced since, the company feels, because of the appearance of cheaper high speed monohulls, a ban in Japan on night operations and an inability to use standard quay facilities.

According to the company, "With detailed investigation of the design targets, a hybrid system of a catamaran with hydrofoils was selected, which is believed to be the best for satisfying various requirements such as speed, seaworthiness and cost-performance. "

The Superjet-30 is an all aluminum construction apart from the fully submerged foils fore and aft which are fabricated in high tensile steel.

Foil System

The Superjet-30 is classified to JG (2nd class ship) limited coast area requirements. Hitachi reports that the full width foils fore and aft support about 80-90% of the vessel's weight during high speed running, so maintaining the required immersion depth of the waterjet inlets, while the 10 to 20% buoyancy of the hulls provides self stability and so eliminates the need for any special structure or controls.

According to the company, the foils "significantly reduce the ship's motion because of their damping effect. In addition, the computer controlled flaps on the foils reduce ship motion to about one eighth of that of conventional catamarans."

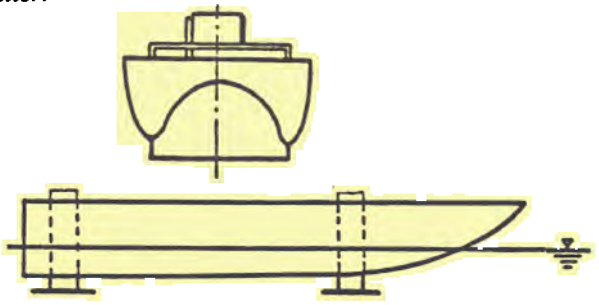
The effect on performance of foil thickness and camber was confirmed by experiments and numerical analyses using several two dimensional foil models. Propulsive resistance, independent foil performance and the lift and drag produced by foils fitted on a hull were then measured in a towing tank. Another area studied through experimental analyses was the minimum depth of fully-submerged foils needed to satisfy the design requirements.

Because cavitation of foil surfaces becomes severe at higher speeds, and speeds of 35 knots and above may result in cavitation on foils having a foil thickness ratio of 10%, Hitachi says that the Superjet-30 "required detailed study of cavitation occurrence and its effects on foil design. We established a cavitation avoidable foil design using the data available from tests in a cavitation tank."

Flaps on the forward foil control vertical motions and compensate for shifts in the center of gravity as passenger numbers and fuel load change. They provide a larger angle of attack when taking off and a smaller angle to maintain constant lift, and consequently stable operation, at nominal service speed. Ailerons on the aft foil control rolling motions.

The company reports that "SuperJet-30 without flap control can reduce pitching motion to about 50% of that of a conventional catamaran, while flap control can reduce it to about 10%.

The control of rolling motion was designed based on Hitachi's experience from surface piercing hydrofoils, and demonstrated through tests with the 12m full scale model *Exceller."*



Superjet-30 Foil System as Represented by Model

When operating with a passive foil system, Hitachi points out, pitching motions are reduced by the foils fore and aft. Rolling and heaving motions are reduced by the buoyancy of the hulls and the damping effect of the foils. The flap control system can either be set in automatic or manual mode. During hullborne operations, in port and at low speed, the captain has no control over either draught or vessel motions.

During foilborne operation the height of the bow can be determined either manually or automatically to maintain directional stability and avoid broaching of the forward foil while rolling angles and rates are automatically controlled.

There is no banking control, Hitachi reveals, "because turning makes smaller accelerations in the lateral direction (as demonstrated by *Exceller)* and quick and high speed turns will rarely be done."

Hitachi Zosen Superjet-30 Particulars

Length overall	31.5m
Beam moulded	9.8m
Depth moulded	3.5m
Draught (approx)	
- Hull only	1.9m
- With foils	2.8m
Gross tonnage	190 tons
Passengers	
- Main saloon	132
- Upper saloon	68
- Total	200
Crew	5
Maximum speed	38 knots
Main engines	2 x Niigata 16V16FX
- 100% mcr	2,500 ps at 1,900 rpm
Waterjets	2 x Niigata/MJP J650R-DD

RIDE ON SS400 "RAINBOW"

(A report was received from Dr. Frank Peterson of Cardercock Division, Naval Surface Warfare Center, who is on assignment to the ONR Asia Office in Tokyo, Japan. The following describes his experiences on RAINBOW.)

The Mitsubishi-built Super Shuttle 400, "Rainbow", was out in the Sea of Japan for ship captain familiarization time following the winter lay-up of December through February. Mr. Toki of Mitsubishi Nagasaki, a major design contributor, accompanied me for 6 hours of ride time. The Rainbow is a high speed passenger ferry operating between Honshu Island and Oki Island. Four papers presented at the FAST 93 Conference, Yokohama, described the overall ship, structure, propulsion, and active control systems, but they will not be summarized here. This report is to summarize my impressions based on the ride and the background on how this particular design concept evolved.

The sea had only a small chop and occasionally moderate swells so it was not the best of conditions to evaluate the active control system. From a passenger's perspective there was a smooth acceleration and it was never apparent when the Rainbow became foilborne. I was told that significant dynamic lift starts at about 18 knots and 100% dynamic lift around 27 knots. This can be controlled somewhat by the operator. For the process just described only 75 to 80% of full power is required thus some jet deflection for maneuvering is possible even while accelerating to 100% dynamic lift. In hard high speed turns there was no change in passenger perceived ride quality. The maximum recorded speed is nominally 45 knots. The swells were not obvious to the passenger but a low level vibration was continuous. My analogy is the vibration one feels on a typical medium sized aircraft. This may have been due to the 4 diesel engines which had essentially no vibration isolation from the hull or possibly related to the active control system. Current Japanese certification is for 2 1/2 meter waves since there was no commercial experience with this craft until last April 1993. As a reference, the Kawasaki JETFOIL has a 3 meter limit.

In 1991 Mitsubishi initiated a concept development that addressed the known concerns of the Oki Steam Ship Co. The concerns, relative to the then current 28 knot monohull "Marine Star", were: increase schedule reliability, improve passenger comfort in high sea state, and decrease trip time to nominally one hour. Schedule reliability is very important if tour groups and others are to book passage. Cancellation due to weather, particularly on holidays, represents a very significant loss of income. Reduced craft motions in a sea way will also attract more passengers. Decreased passage time encourages Oki Islanders to take the early morning trip for business on Honshu Island and return in the afternoon. Competition is essentially the airplane. Oki Steam Ship Co. wanted to replace the monohull with a high speed craft that had improved performance and the JETFOIL was a viable candidate. Diesel engines were preferred because their mechanics already had diesel experience and no gas turbine experience. The end result is a 340 passenger hydrofoil catamaran compared to a nominal 250 passenger JETFOIL with both having comparable ride and cruise speed. The JETFOIL uses gas turbines, but somewhat less propulsion power. All passengers are inside the cabin during passage with seating similar to that of an aircraft. Since passage time is short, only drink vending machines are used.

I have no comparative operational cost information but it appears that the lower monohull construction cost is offset by the greater income producing potential of the hydrofoil catamaran for this application. Mr. Toki indicated that in 1993 almost all tourist locations in Japan had a reduced number of summer tourists compared to the previous summer. However, Oki Steam Ship Co. had an overall increase in passengers even though the number of their car ferry passengers decreased. My impression, given the limited operational data available to me, is that the Rainbow is a very good example of the merit of high performance to the customer.

JIM SCHULER - From time to time some of our members inquire about Jim regarding his recovering from the heart attack that he had five years ago. I recently had a conversation with his wife, Marie, to find that his condition is stable and not changed much over the last several years. "He has his good days and his bad days." For those who may have forgotten, Jim suffered a heart attack and "post-sudden death" which resulted in slight damage to his entire brain as opposed to a stroke, which is more concentrated and from which some people recover.

Jim is strong, in some physical respects, except that his legs are rigid, he is confined to a wheelchair, and can only walk with a walker with much assistance. He gets out of the house only on rare occasions. Jim is able to read OK, watches TV, but has a short attention span. He enjoys getting the IHS Newsletter and other sources of news about his favorite subjects. On some days he is distressed with himself and feels frustrated that he can't do the things he used to do.

Jim would be very pleased to hear from our members and learn what they are doing - so please write, even a short note. His address is: 807 South Belgrade Road, Wheaton, MD 20902. *J. Meyer*

WORKSHOP ON ECONOMICS OF FAST FERRIES

By William Hockberger

SNAME Panel 0-36 held a workshop on the economics of fast ferries on 27 January 1994 in Washington, DC. There were 21 persons in attendance representing various elements of the marine industry in the U.S. No ferry operators were present, but shipbuilders Trinity Marine, Textron Marine, Peterson Builders and Kvaerner Masa Marine were represented. Six SD-5 panel members attended.

The workshop was loosely structured to hit all the major issues affecting fast ferry operations and economics. Users of fast ferries were categorized as commuters, tourists and irregular local users. Competition for their business was seen to consist of other passenger vehicles - buses, trains, planes - or other ways of carrying cars, such as roads, bridges and tunnels.

As a framework to guide the discussions, the panel chairman, Jennifer Zeien, presented a general overview of the many aspects and circumstances involved in fast ferry services. The characteristics of commuter versus tourist services were pointed out, along with the possibilities for dual use of ferries for both purposes. The effects of geography and urban concentration were noted.

The biggest issues affecting the viability of fast ferry services in the U.S. were seen to be ferry motions and passenger comfort, reliability of service, ticket prices, operational restrictions imposed by local authorities, and the generally low standard of most U.S. attempts at fast ferry operations.

Regarding ticket prices, it was pointed out that few people really compare the full cost of driving with such alternatives as ferries. A car can look inexpensive, if only gas and tolls are considered, ignoring the bulk of the capital and maintenance and insurance and parking and other significant elements. Also discussed at length was the problem posed by subsidies available to other more-established forms of public transportation with which ferries must compete.

The low standard of many ferry operations was seen to be chiefly a matter of too low a capitalization and too little attention to marketing the services and to meeting the riders' expectations. The meager capitalization reveals itself in too few vehicles, low vehicle reliability, too few employees for operations and maintenance, inadequate port facilities (including accessibility and amenities for passengers), and insufficient financing to make it through an initial unprofitable period.

Some special characteristics of the U.S. situation affecting fast ferry possibilities were noted. A significant factor is the prevalence of cars and good roads in this country and the American penchant for flexibility and independence from constraints. Another is the relative absence of deeply indented coastlines impeding travel routes or bodies of water lacking other means for crossing.

Some brief presentations were made that added depth in certain areas: A model developed by Band, Lavis and Associates for simultaneously dealing with both the technical and the economic factors related to a fast ferry design project was described and some study results shown. An overview was given of the 1983-4 UMTA (Urban Mass Transportation Administration) study of the potential for ferry operations in the U.S. A paper by Professor Akagi, of Osaka University, was reviewed and discussed as providing a fairly comprehensive model for ferry transportation planning. That paper is unique in including the value of a passenger's time as an element in the total cost of transportation.

There was a consensus at the end of the meeting that there is a real need for an economic model to aid operators in determining whether or not a particular ferry service could be profitable and what type and characteristics of vehicle should be employed. A group of SNAME 0-36 panel members will convene in the near future to begin the process of developing such a model.

ENGLISH CHANNEL FAST FERRY OPERATIONS

(From Fast Ferry International, December 1993)

Companies operating fast ferry services across the English Channel have now published their preliminary timetables for 1994, the first year in which they will face competition from Eurotunnel's Folkestone-Sangatte passenger-car trains and Eurostar's London-Paris/Brussels passenger trains.

Eurotunnel expects to introduce its "le Shuttle" service in May. By the time this is fully operational, the company will be offering at least one departure every hour throughout the day/night and as much as one departure every 15 minutes at peak times.

Eurostar will be offering "over 30 cross-Channel departures a day". The company; a joint venture by the state railway companies of Britain, France and Belgium; is claiming that the London-Paris journey time via the Channel Tunnel will be "little more than three hours".

Promotional material from Eurotunnel indicates that the company is allowing five minutes for car drivers to travel from the motorway exits to the ticket booths, 12 minutes to get from there to the platform alongside the train, eight minutes to load the train and 35 minutes to complete the crossing beneath the Channel - giving a total time of 60 minutes for the trip from the motorway on one side of the Channel to arrival at the terminal on the other side.

Eurotunnel is stressing the frequency, convenience and smoothness of its service. It must be galling that it cannot claim the fastest motorway to motorway time. The company had been working on the assumption that Hoverspeed's SR.N4 hovercraft would have all been withdrawn by the time the Tunnel had opened. However, not only are there still two SR.N4 Mark 3 hovercraft in service, but Hoverspeed is working them harder than ever and they are expected to remain in service for the foreseeable future.

The company, understandably, has lost no time in pointing out that its check-in time of 20 minutes, average Dover-Calais crossing time by hovercraft of 35 minutes and disembarkation time of five minutes gives a total motorway to motorway time of 60 minutes.

Even faster journeys are possible and, as Hoverspeed chairman David Benson said at the 'After the Tunnel' conference in October, "Unlike le Shuttle, we know this time is achievable because we've been doing it for 25 years!

The biggest change to fast ferry operations on the English Channel in 1994 will be the transfer of the English end of Regie voor Maritiem Transport's (RMT) route from Dover to Ramsgate. The move has necessitated a change in operating name for the state-owned Belgian ferry company from Oostende Dover Line to Oostende Lines.

Scheduled crossing time for its two Boeing Jetfoil 929-115 hydrofoils has been marginally increased, by five minutes to 1 hour 45 minutes, but otherwise the timetable is much the same as that of previous years except that no services will be operated for the first 30 days of January while a berth is being prepared in Ramsgate harbour.

One Jetfoil is then scheduled to operate two return

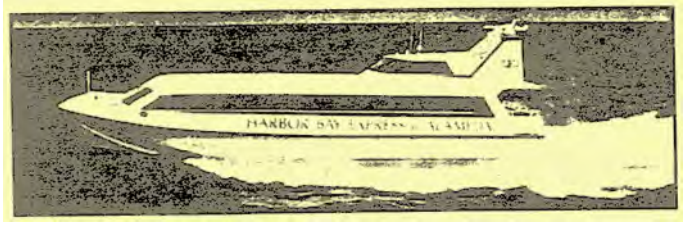
services a day until March 17. Both vessels will be required to maintain the timetable for the rest of the year as frequencies increase to four returns a day during March 18-June 30, five during July l-September 1 (six on Saturdays in July and August), four during September 5 - October 22 and three during October 23 - December 31.

Oostende Lines will be the fifth colour scheme to appear on RMT's Jetfoils in less than nine years. When they were introduced in 1981 the vessels carried the livery of Sealink then RMT's marketing partner. In 1986 RMT joined forces with Townsend Thoresen who was acquired the following year by P&O European Ferries. RMT consequently adopted P&O s colours but not its logo until establishing an independent identity as Oostende-Dover Line in 1992. Rather than renew its agreement with P&O the company has now opted to have Sally Ferries as an operating partner and transfer its Oostende services from Dover to Ramsgate.

USA CATAMARANS DEBUTS ITS FOIL-ASSISTED PLANING CATAMARANS

(From Maritime Reporter, February 1994)

USA Catamarans, Inc., of Fort Lauderdale, Fla., introduced its line of high-performance planing aluminum catamarans, all of which are foil-assisted with the foils reportedly carrying in excess of 50 percent of the total weight. The first vessel built by the company is the 65-foot *Harbor Bay Express II Alameda*, a vessel which was due for delivery to the City of Alameda on San Francisco Bay in February. The vessel, powered by MAN D2842LYE engines, is designed to shuttle commuters between Alameda and San Francisco, a distance of approximately seven miles. This is the Andromeda Class catamaran design, which has asymmetric demi-hulls with one main foil between the hulls. Canards at the forward step and flaps at the aft step are hydraulically operated with trim controls to optimize planing angle.



New Fast Ferry Made its Debut on Alameda - San Francisco Bay in February

The main engines, rated 1,000 hp at 2,300 rpm, drive France Helices four-blade surface props through ZF 165PI gears. Full load speed is 30 knots, and the vessel was designed for partially protected waters and Sea State 3 (for the 65-foot Cats). The pilot house is arranged like an aircraft cockpit, with console and D.C. panel on center between pilot and co-pilot seats. The electronic package onboard includes a Raytheon R81X and a R41XX radar; a Ray 390 GPS; a Ray 420 loud hailer; two Ray 90 VHF radios; Sail Comp digital compasses; and Robertson autopilot. The passenger cabin is arranged with passengers facing each other generally, rather than facing forward. The vessel is certified to carry 147 passengers and crew.

USA Catamarans also offers vessels from two additional lines, the Dynacat and the Cyclocat. USA Catamarans was organized in 1989 by Manny Kaluris, president and CEO of Yacht Basin, Inc. Mr. Kaluris is a marine engineer and propulsion specialist with extensive experience. The other principal is Chuck Baum, a naval architect and marine engineer in aluminum boat building, with experience in highspeed catamarans.

NOTES OF INTEREST

(By Robert J. Johnston)

Capt. James W. Orvis USN, a former Navy hydrofoil skipper, has had a most busy year with his naval activities as a staff officer, carrier based. They were making a port call in Hong Kong when ordered to the Persian Gulf. The carrier based air crews patrolled the no fly zone over Iraq. The first week of October they proceeded to the coast of Somalia to assist the UN forces in that country. From Somalia they made a port call in Perth, Australia and proceeded to Honolulu. Jim flew back to San Diego to evaluate sea exercises on board the USS California and was able to be home for Christmas.

* * *

Our IHS President, John R. Meyer, had a very interesting article published in the January 1994 issue of "The Naval Engineers Journal" entitled "Hybrid Hydrofoil Technology Applications". The hybrid hydrofoil designs described include USCG patrol craft, US Navy long-range missile patrol craft, a multi-mission deployable vehicle, a multi-mission support vehicle, and a small combatant, along with several commercial versions of the hybrid hydrofoil concept. He also co-authored with Mike Bosworth and Scott Black another article on "Multi-Mission Deployable Vehicles" in the same issue.

* * *

Mr. W. R. Frank, an 81 year young sailing enthusiast from Barnsley, England, reports that Dave Culp of Pleasant Hill, California is building a sailing hydrofoil. His goal along with other members of the sailing hydrofoil fraternity is to achieve a speed of 50 knots. The IHS Newsletter would be delighted to report the progress of this sailing group. Lets hear from you.

* * *

The University of Minnesota offers to its engineering seniors a project-based design course. The term "capstone design" is used to describe such courses, whose mission is to integrate, through the vehicle of design, what the student has learned during the previous four years. One of the projects undertaken was the development of a human powered hydrofoil. From what is known the vehicle is a canard with a single, submerged, flat, steerable foil forward and a U-shaped, constant chord, submerged foil aft. A forward surface feeler connected to the front foil provides take-off and height control. Their goal is to achieve a speed of twenty knots. IHS would also like to hear more about this project.

THE NEWSLETTER

INTERNATIONAL HYDROFOIL SOCIETY

Post Office Box 51, Cabin John, Maryland 20818, USA

Editor: Robert J. Johnston | SUMMER 1994 | Co-Editor: John R. Meyer

IN THIS ISSUE.....

ELECTION RESULTS

IHS MEMBERS ELECTED THE FOLLOWING TO THE 1994-1997 CLASS BOARD OF DIRECTORS:
Mark R. Bebar, George Jenkins, John W. King, and Cameron Mixon

AT THE MAY 17, 1994 BOARD OF DIRECTORS MEETING, THE FOLLOWING OFFICERS WERE ELECTED:
President: John R. Meyer; Vice-President: Mark R. Bebar; Secretary-Treasurer: John W. King

ADVANCE NOTICE

APRIL-MAY 1995

IHS 25TH ANNIVERSARY

PLANS ARE NOW BEING CONSIDERED BY THE BOARD OF DIRECTORS FOR A CELEBRATION OF THE SOCIETY'S 25TH ANNIVERSARY NEXT YEAR. THE BOARD WELCOMES YOUR SUGGESTIONS, INDICATION OF INTEREST AND YOUR POSSIBLE INTENTIONS TO ATTEND A MULTI-DAY PROGRAM. NO DEFINITE LOCATION HAS BEEN SELECTED AT THIS TIME, BUT SOMEWHERE WITHIN 50 TO 100 MILES OF WASHINGTON, D.C. IS ENVISIONED.

THE PRESIDENT'S COLUMN

Since the last Newsletter, the IHS Board of Directors, in conjunction with The Society of Naval Architects and Marine Engineers (SNAME) SD-5 Panel, and the U.S. Hovercraft Society are beginning to make progress on the subject of the High Performance Marine Vehicle initiative in the U.S. Jack Offutt, Mark Rice and John Meyer met with ARPA personnel Bob Schaffran and Andrew Dallas on 4 May. As a result, Bob Schaffran was receptive and supportive of the Commercial HPMV Initiative being proposed as part of the MARITECH program. He felt that Carderock Division, Naval Surface Warfare Center (CDNSWC) could be helpful in several areas - namely, evaluating proposals to ARPA involving HPMVs, and a workshop on this subject in the Fall of 1994. The workshop on HPMVs would be an efficient way of getting designers, builders, operators, financiers, and legislators together in one place at one time to discuss the subject.

At a recent Board meeting it was suggested that the previously designated Congressional Liaison Committee be changed to "New Opportunities Committee" to more accurately reflect the recent activities of this group, as described above. However, at Capt William Erickson's suggestion, a "Congressional Issues Committee" was formed. See page 12 for a description.

The Society's 25th Anniversary will be in 1995. At the June Board meeting, it was agreed that a "Festive Event" should be held during the year - probably at the usual time of our Annual Meeting (April or May). I ask all of our members to think and react to this proposal. Please let your Board know of your interest in attending such an Anniversary event and what you would favor for its content, number of days, and if you would be willing to participate in the "Program". Reminiscent of the First International Hydrofoil Society Conference in Nova Scotia in 1982, we want to retain the International flavor of the celebration.

At the risk of repeating myself, there is one issue which is important to bring to the attention of some IHS members - that is your 1994 **Dues**. IHS Treasurer, John King has just sent out a plea to all members who have not paid their 1994 Dues. As he pointed out, we have not adhered to the practice of sending out separate, formal invoices for annual dues, but rather a call for dues and follow-up reminders have been included in quarterly Newsletters. Because of the expenses associated with producing and mailing four Newsletters per year, and other mailing expenses, the Society needs your financial support and requests that each of you retain or reinstate your "in-good-standing" status as soon as possible.

I regret to report that the Board has received and accepted a letter of resignation from John Monk who has faithfully and admirably served the Society in many ways over a long period of time. Captain William Erickson, USN has agreed to serve the remainder of John's term on the Board. *John R. Meyer, President*

CONGRATULATIONS TO PHIL YARNALL

We are pleased to announce that Phil Yarnall, an IHS Member, long-time contributor to the U.S. Navy hydrofoil program, and Board member was recently presented an award for Navy Meritorious Civilian Service. The CITATION read:

> *For outstanding contributions, accomplishments and leadership while serving as Head of the Large Cavitation Channel Project Office, CARDEROCKDIV, NSWC. For assuring that all authorizations were obtained from Congress and DOD and that funds were in the U.S. Navy FY94 budget for the real property purchase and settlement of the leasehold improvements from CBI Na-Con, Inc. His actions resulted in the successful buyout of the site of the Large Cavitation Channel.*

All of us in the IHS extend our heartiest congratulations to Phil on this occasion.

HARRY H. WALLACE

Harry Howard Wallace Jr. died March 14, 1994 at the Sibley Hospital, Bethesda, Maryland. Harry's career included engineering in aerospace, nuclear power and hydrofoils. He was a member of the International Hydrofoil Society and a devoted supporter of the hydrofoil concept. It is with sadness and sincere regret that the Society notes his death. The Society extends its condolence to his wife Betty and their children.

Harry graduated from Rensselaer Polytechnic Institute in1939. During the war years, He worked on developments for the B-29 aircraft. He also qualified for a pilot's license and enjoyed flying aircraft for many years. After WW II was over, he worked for the Air Force in Oak Ridge, Tennessee. During this period Harry took advanced studies in nuclear engineering at the University of Tennessee. His work at Oak Ridge involved the study and evaluation of nuclear power for aircraft applications. In 1956 he joined the Garrett Corporation assigned to the development of life support systems for the first spacewalks for NASA. Garrett later assigned Harry as their program manager for their interest in the development and sale of hydrofoils.

Garrett joined Grumman in a joint venture to develop a commercial hydrofoil. This effort led to the design, construction and operation of the hydrofoils named "Dolphin". Harry became quite involved in the evaluation period of the "Dolphin" while it was operating between Miami and the Bahamas. When "Dolphin I" was assigned to the Virgin Islands, he accompanied the craft as a member of the operational staff representing the interests of Garrett. In 1972 he joined the Naval Research and Development Center, Bethesda MD and assigned to the advanced hydrofoil program. He continued to work on hydrofoils until his retirement in 1982.

PRESENTATION OF MARTIN C. PILSCH, Jr. TO JOINT DINNER MEETING

(Notes courtesy of Ken Spaulding)

Marty Pilsch is Manager, Special Projects with the Urban Harbors Institute (UHI) at the University of Massachusetts. He is managing a three year federal Department of Transportation (DOT) grant, established to provide detailed analysis of the status of waterborne mass transportation in the United States. At the April 29 dinner meeting, Mr. Pilsch discussed these studies and presented some of the results.

In opening, Pilsch noted that the study was not yet complete. He stressed his dedication, along with that of Tina Casgar, of the Transportation Research Board (TRB) who was at the presentation, to establishing a National Ferry Policy. The establishment of such a policy would bring recognition to the role of ferry services and would open doors to various sources of funding.

Pilsch said that the UHI had been established in 1988 at the University of Massachusetts. This sponsorship had proven ideal with respect to location and support provided. UHI has embraced many "disciplines" in their studies. The University is currently forming a Marine Coastal Center. UHI has two basic functions: (1) Coastal zone management and harbor development, both of which take on an environmental and land conservation direction. The Institute has managed studies involving land utilization along the Chelsea, Massachusetts, waterfront, water quality in two studies, one on the Gulf of Maine, one on Stellwagen Bank and a number of coastal zone management consultative type assignments for the World Bank on the establishment of coastal zone management plans in a number of foreign countries; (2) Conduct of the DOT grant. This includes eight studies over the first two phases and one, three part research project about to begin which will continue until completion of the third phase of the grant on 31 January 1995.

The DOT studies completed include the subject report, a study on the impact of the Americans With Disabilities Act (ADA) of 1990 on the passenger vessel industry, a data base on ferry systems in the United States, a database tabulating the dimensions of critical areas on ferry and excursion vessels in preparation for the establishment of an FTA regulation on ADA and waterborne transportation, a report on the impact of subsidies on ferry systems, a feasibility study on commuter service along Boston's Charles River and an impact assessment of the Woods Hole, Martha's Vineyard and Nantucket Steamship Authority.

An impact study regarding the Federal Transportation Administration's Americans with Disabilities Act looked at areas such as stairwells, thresholds and doorways. This is a sensitive, high impact area. DOT is in the final stages of preparing regulatory legislation. The legislation may be two years away but the approach is expected to be resolved in 6 months.

In the subject study UHI looked at 25 U.S. routes, including: Seattle area, Alaska Marine Highway, New York Area, Boston to Hingham and Logan Airport, Port Clinton to Put-in-Bay, San Juan, PI, Mississippi, San Francisco, Portland - Casco Bay, and Cape May to Lewes. The study was eventually narrowed to 9 promising routes. Pilsch projected maps of each of these areas showing proposed routes.

Pilsch noted that Massachusetts Chapter 91, covering waterfront property development, requires investment in marine improvements. He said that there were some examples of successful operations in the Boston area. He mentioned a rail connection at North Station.

In San Francisco two leading ferry operators are the "Red & White Lines" and the "Blue and Gold Lines". Both lines are operating high speed catamarans. The "Golden Gate" run has a high speed monohull.

Pilsch discussed several current and future operating areas in the New York area: Cross-Hudson, Bay Shore (NJ)/ Atlantic Highlands and Long Island Sound. The Bay Shore run has Incat 30 knot catamarans (which must slow down in the East River) and charges $15 each way. For the "high rollers" from Bay Shore, a high ticket price in not an impediment.

A map of the Portland-Peakes Island (Casco Bay) run was displayed. This run commonly includes rough water.

Pilsch discussed the many possibilities in the lower Mississippi area (New Orleans, Algiers, Gretna, Chalmette), noting that many roads "dead-end" at the river.

The cross-harbor run to Old San Juan has been operating for 4 or 5 years. This operation accommodates commuters as well as tourists.

Pilsch said that there was definitely a trend to higher speed (high tech) requirements while acknowledging wake restrictions and speed reductions in congested areas.

In Seattle, San Francisco and New York land based competition is not as effective. In Seattle (to Bremerton etc.) there are no good alternatives today to ferries. Pilsch related the history of the State of Washington's Department of Transportation, which after considering highway alternatives in the 1950s went with ferries. In the early years a privately operated "mosquito fleet" provided passenger service (1900-1940). Cars and some freight are also moved by ferry in the Seattle area. In the immediate Seattle area, runs range from 2.6 to 5.5 miles in length. Wake is a serious problem in two areas. The run to Victoria is a private operator, running InCats. The ferries represent a "marine lifeline" to many communities; the State of Washington's DOT has 20 terminals today. Seven new routes have been proposed. High speed is desired on some routes. The environmental factor is clearly a driver; exhausts from waiting/idling autos pose a serious environmental concern.

Pilsch said that Alameda had acquired Intermodal Surface Transportation Efficiency Act (ISTEA) support for their new high speed catamaran. Some San Francisco operations continue 16 hours/day. The airport connection (Oakland-San Francisco) has a shallow water area which may dictate ACVs.

Pilsch cited an excellent publication entitled "Ferries of America - A Guide to Adventurous Travel", by Sarah Bird

Wright, published by Peachtree Publishers, Ltd., 494 Armour Circle NE, Atlanta, GA, 30324. It is a comprehensive treatment of U.S. ferry operations, published in 1987, and can be purchased for $12.95 + $2.75 handling charge.

Pilsch summarized the recent New York initiative to support the development of turn-key ferry services. Gladding Hearn is involved in one of the proposals. ARCORP is proceeding with development of a high speed service. New York has a potential of over 22,000 passengers per day. Pilsch said that New Yorkers (many of whom never own automobiles) are mentally ready for commuting by ferry.

A viewgraph showed a pie chart which illustrated the following priorities of ferry riders:

Time	27%
Comfort	36%
Reliability	22%
Seating	15%

Ferry services were sorted into three categories:

1 - essential - sole means of transport
2 - complimentary water route (less congestion)
3 - optional

Conclusions were that technology advances may be marketable. High speed ferries may be more competitive. Essential services will continue and will expand. Complimentary services will expand to meet new needs. Optional services will increase. ISTEA has opened some doors. Intermodal services will be supported. Specific routes will be locally determined. Services will support commuters and tourist/recreational users. There are two new factors; the infrastructure is running out of space for new roads and environmental concerns will become more dominant.

In closing Pilsch again emphasized the need for a National Ferry Policy. Ferries must be recognized for their "value" and potential. Today the average U.S. "man-on-the-street" couldn't care less about ferries. We must carry the message to the decision makers. Passenger Vessel Association and TRB are players.

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UPDATE ON THE PACIFIC RIM

(Notes On a Meeting with Frank Peterson, ONR-Asia, 18 May 1994, by Ken Spaulding)

Dr. Peterson was in Washington for a few days at approximately the midpoint of his 6 month assignment to ONR Asia to investigate Advanced Marine Vehicles (AMV) activities in the Asian area. He is stationed in Tokyo and has visited China (2-1/2 weeks), Korea (2 weeks), Singapore (5 days) and Hong Kong (5 days), and was scheduled to spend the first two weeks of June in Australia.

Peterson initially mentioned activities in Japan, including; Super Slender Twin Hull SSTH 30, the Hitachi CP30, the Mitsui *Mighty Cat*, the Mitsubishi Super Shuttle 400 *Rainbow*, the Mitsui *Seagull*, the two Techno-Superliner craft and the AMD 1500 passenger/car ferry in construction by Kawasaki H. I. He noted that China is building a military SWATH and several types of ACVs.

KOREA

Semo Shipyard

Semo is a relatively small yard. They are also ferry operators and have a particular long term interest in building and operating fast ferries. Semo bought a production Cirrus 120P (Peristroika) and constructed a near identical craft using Glass Reinforced Plastic (GRP) in their yard. They are also building GRP monohull patrol boats. This second craft was named *Democracy I.* Semo then accomplished some redesign (including testing at DTRC) and constructed a third craft, *Democracy II.* An imported special high strength mat was utilized in the GRP hull. This craft went into operation 4 weeks ago. So, at this point, Semo has three craft operating from Cheju to Mokpo with 2 stops, on a 3 hour run. A fourth craft is in construction and a fifth is planned. Semo plans to build the 6th craft in aluminum. Their price quote for the 350 passenger craft is approximately $6.5 million.

Samsung

This is a relatively large yard - with 5,000 employees. Samsung's first SES, Dong Yang Gold, carrying 350 passengers, is currently being operated by the Dong Yang Company from Mokpo to Hong Do. Their price estimate was approximately $9 million. Construction is single skin Kevlar composite with foam core above the waterline. Some vacuum bagging was used during fabrication. Seals were produced by Avon and control systems by Autronics. They have some vibration problems and have had some difficulties with waterjet shafting alignment after launch. Samsung feels that GRP construction costs are higher than aluminum. Samsung has a working agreement, for shipbuilding technology transfer, with Newport News Shipbuilding (Samsung Research Institute).

Daewoo

Daewoo has 10,000 employees. They currently have the largest drydock in the world. They are building the "F Cat-40", billed as "the fastest cat on the market" (41.5 knots with 1/3 load). The Kvaerner Cat (37 knots) sells for $4.5 million, the F Cat considerably more. Sea trials in 2 to 2 .5 meter seas reduced the speed to only 39 knots. The F Cat has two MTU 2,000 KW diesels with KaMeWa (63) waterjets. (This MTU engine is very competitive and very popular now). The F Cat bow design is unique, described as a long slender entry ahead of the stem. There is one foil, just aft of the LCG. The foil is very shallow, 1/2 meter below the surface. The F Cat will begin operation on 2 June from Okpo to Pusan. This version carries 250 passengers and eight cars. Daewoo strongly favors aluminum over GRP. GRP is considered to present serious health fabrication hazards and the material is not recyclable. Peterson mentioned that as the Japanese GRP fishing craft wear out, the fishermen sometimes simply sink them, which introduces some problems with environmentalists.

Hyundai

This yard has 20,000 employees. They completed a Foil-Cat in 1992 which is not yet operating as they found the foils to be inadequate and are modifying them. The foil is to carry approximately 1/2 of the craft weight.

Korea - General

Peterson said that, by law, the builders must put 3% of their profits into R&D. Otherwise, this funding reverts to the government. Consequently there is a lot of R&D and facilities development. All of these yards, with the exception of Semo, which is small, are viewing these "small" AMVs simply as stepping stones to large fast car ferries.

There was an impression that the Koreans are glutted with capital. They price themselves just under the Japanese but their labor rates are way under Japan's, producing very impressive profit margins. Their labor rates are rising.

SINGAPORE

Kvaerner Fjelstrand, with 200 employees, has a capacity of twelve 40-meter fast cats a year. These craft are priced at $4.5 million (add 1/2 million for ride control). They produced eight this year and expect to build nine next year. Kvaerner has been building in Singapore for four years. They say that they can match the Austral export price of $4.5 million and can actually beat their price for delivery in Australia since the Australian subsidy applies only to exports.

A Singapore builder of aluminum craft is currently helping to set up a plant in Dong-Guan China to build catamarans.

HONG KONG (See excerpts from Fast Ferry International on page 7 of this NL)

Peterson said that there were 24 ferry operators in the general area around Hong Kong. Chu Kong Shipping, a major operator, has just taken delivery of three 350 passenger Austral 42-knot cats with Lycoming turbines ($6.3 million).

A 4-diesel catamaran with a speed of 40 knots has been delivered. There is a "standing order" with Wavemaster International in Australia for a series of these 49 meter 43-knot cats.

In Hong Kong there are currently 78 vessels operating with KaMeWa waterjets, 32 of them operated by Chu Kong. There are over 100 high speed ferries.

Park View Shipping Co. has 5 of the Kvaerner Flying Cats (with two 2,000 KW MTUs). They have ordered five 45-meter, 49-knot TriCats, with Solar gas turbines, from FBM.

Far East Hydrofoils, with 16 Boeing Jetfoils, operates a 24 hour service across the Pearl River estuary to Macao. They operate with night vision devices.

CHINA

The PS-30, designed by CSSRC is a redesign of the Boeing/Kawasaki Jetfoil. Aluminum is imported from the UK and they are using welders from the U.S. They are offering these craft for $13 million - compared to $22 million from Kawasaki. Kawasaki is still building but has no export orders.

There are two WIG builders in China. MARIC is building a PARWIG. There are two ACV builders ("no-wake" stressed). CSSRC has been designing ACVs for 30 years. The Chinese are laying a special tax on all craft making a wake exceeding 1/2 meter.

Twelve Russian 60 passenger, 35 knot, shallow draft craft were delivered several months ago. Peterson was very impressed by the smoothness of operation and near zero wake.

AUSTRALIA

The new design 89 meter (29 meter beam) AMD 1500 Jet Piercer will carry 850 passengers and 200 cars at over 30 knots. Waterjets are by Kawasaki and power is four 5,000 HP Caterpillar diesels. Construction started at Kawasaki in April of this year.

PHILOSOPHY AND GENERAL IMPRESSIONS

Peterson notes that all the big ("Seven Big Sisters") Japanese yards are moving toward large fast car ferries. He feels that it will be very hard for U.S. builders to ever compete with the Asian yards in AMV hull production, particularly since most countries want to do this domestically. However, he notes that they are (at least to date) using U.S. gas turbines. There is a market for materials (aluminum and composites) which are generally imported and perhaps a market for hightech devices such as night vision systems.

THE PASSING OF AUSTRALIAN HYDROFOILS

Mr. Martin Grimm, a naval architect employed by the Australian Department of Defence, recently wrote our Society regarding membership. He expressed considerable past and present interest in hydrofoil vehicles. The following excerpt from his letter describes what is happening to hydrofoils in Australia.

"Sadly, in Australia we have in recent years lost our most notable hydrofoil operation based in Sydney and operating the Circular Quay to Manly high-speed ferry service. There are now only a few small hydrofoils such as Aquavion Aquavits in operation in Australia.

"The most interesting hydrofoil remaining in Australia is the Hitachi PT-20 "Manly" which was the first major hydrofoil to be imported into the country. This craft arrived in Sydney in late 1964 and was operated by the Port Jackson and Manly Stearmship Company. The ferry service was subsequently taken over by the state government and operated by the Urban Transit Authority. In 1979 "Manly" was sold to a Queensland based tourist ferry service and renamed "Enterprise". The craft was withdrawn from service in the 1980s and a private owner commenced a conversion of the craft for hullborne operation only. These plans never came far and the craft was again sold in 1991 to another individual who had it transported to Victoria for rebuilding into a seafood restaurant! Unfortunately due to financial difficulties, the craft is again for sale and may be scrapped if no genuine buyer can be found.

I am currently trying to find other hydrofoil enthusiasts in this country to help purchase, restore and display "Manly" as I consider it to have a significant place in Australia's maritime history."

Editor's Note: Martin Grimm has recently joined the IHS, and we all join in welcoming him as a new member of the Society.

LETTERS TO THE EDITOR

Jean E. Buhler, a naval architect and marine consultant from Miami, Florida and a good supporting member of IHS, sent the following comments (to Bob Johnston) regarding the George Meinas story published in the Winter 1993 Newsletter. Jean was a participant in many of the events described in the story as one the owners and the naval architect for Miami Shipbuilding Corporation.

"As I recall it, one day we discovered an ad in "Yachting", by some one unknown to Miami Shipbuilding, selling hydrofoils in Miami just 16 blocks from our office. We were at that time designing and building test hydrofoils for the Navy on a classified project. You then made an appointment for an interview and we arrived about four strong for the lecture and sales pitch on hydrofoils by none other than George Meinas.

"The lecture went smoothly as we "experts" listened intensively to the thick German explanation although the lecturer kept-looking at you throughout his speil. Actually, he must have been mulling over the fact that you had introduced yourself as Mr. Johnston. Suddenly, he stopped in the middle of a sentence and pointing his finger at you said, "Aren't YOU Commander Johnston?" To which you blushed and said, "yes". "I thought so..." After which there were some remarks that I can't quote at this late date about you having stolen his knowhow. With that, the lecture/sales pitch broke up.

"The next humorous bit came when George discovered we were building the two man torpedo-like Cloak & Dagger (C & D) craft for ONR/Marine Corp. behind closed doors and excluding him from seeing it regardless of how he tried to peek. Finally, we had to move it out at night to Commodore Ralph Munroe's boat house where Alexander G. Bell had been experimenting with a model of the HD-4 just 40 years earlier.

"Besides being a hydrofoil designer George considered himself an artist and unbeknown to us he made an oil painting of our 24 ft "Holiday Jr." as a wedding present for Phyllis and me. Further, the painting was framed in a wrought iron scroll grille, all of which he made while struggling to get his sample boat ready for the Boat Show. It is no great work of art but because of the intriguing story of the artist it has a historical background which cannot be duplicated. Phillip, our son, has it hanging in his living room in Jacksonville."

FIRST RODRIQUEZ SEAGULL 400 CATAMARAN ENTERS SERVICE

(From Fast Ferry International, January/February 1994)

The first catamaran built by Rodriquez Cantieri Navali, the 43.25m *Achernar*, entered service with Campania Regionale Marittima on the state-owned operator's Napoli-Capri route on October 2, 1993.

The design, known as the Seagull 400, is the latest development in Rodriquez's strategy to expand its fast ferry range to include catamarans and monohulls as well as the hydrofoils for which it is so well known.

However, bearing in mind that the company has fitted ride control systems to virtually every hydrofoil it has delivered in the past 20 years, it comes as no surprise that *Achernar* is equipped with a "Sea Augmentation Controller". Developed by Rodriquez itself, this is based on a strut mounted foil, featuring a full width flap, located forward on each hull. Although the vessel is fitted with trim tabs, these are not part of the ride control system.

Rodriquez Seagull 400 Characteristics

Length overall	43.25m
Length waterline	36.40m
Beam	1 0.90m
Hull depth (0.5 L)	4.40m
Draught	
- Full load	1.64m
Displacement	
- Lightship	115 tonnes
Deadweight	35 tonnes
Capacities	
- Fuel	10,000 litres
- Fresh water	2,000 litres
Passengers	
- Main deck	254
- Upper deck	100
- Total	354
Crew	8
Service speed	
- Full load	32 knots
- 2/3rd load	34 knots
Range	200 nautical miles
Main engines	2 x MTU 16V 396 74L
-100% mcr	2,000 kW at 2,000 rpm
Auxiliary power	2 x MTU 6R 099 TA5 1
	Stamford OM 366A, 78 kW
Waterjets	2 x KaMeWa 71 Sll
Classification	RINa +100 A (UV), TP NAV.S

SUPERJET 30

(From a March 30, 1994 report by Frank Peterson at the ONR Asia Office)

The Superjet 30 by Hitachi Zosen is a 200 passenger foil assisted catamaran. The University of Tokyo was very influential in the concept development and carried out many of the early model tests. This fast ferry concept evolved from the desire to have good seakeeping qualities, while using a conventional waterjet to control costs. At the calm water cruise speed the foils provide nominally 80% of the lift. Forward foil flaps are used for mean bow height control and, when installed, aft foil flaps are used for roll control.

Seven Superjet 30's have been ordered, 4 recently delivered and 3 to be delivered by September 1994. The maximum speed varies depending on the outfitting and auxiliary machinery selection. A150 passenger version for service to the new Osaka airport has a maximum speed of 40 knots while a heavier more luxurious version has a 36 knot maximum speed.

In March of this year, I traveled on the ferry from Matsuyama on Shikoku Island to Hiroshima with 2 Hitachi representatives. During the passage there was a 1 meter wave height and a 35 knot wind. As a demonstration, the Captain turned off the roll control briefly and the increase in roll was obvious.. For those routes where the water is relatively calm the ride control is not installed. According to the ship's captain, during delivery from the shipyard to the home port high seas were encountered. With ride control off, air was ingested into the waterjet inlet at a 1 meter wave height. With the ride control on, air did not ingest until waves exceeded 2 meter height. Throughout the trip very little motion was apparent and noise and vibration were hardly noticed. The ship was designed for 2.5 meter waves, the ferry company limits operation to 2 meter wave height, and the captain has experienced 3 meter waves with no problems occurring.

"This design appears to have achieved the original objectives and it is my opinion that the concept can be scaled up or down to satisfy the needs of customers and their specific route requirements."

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HONG KONG FAST FERRY ACTIVITY

(From Fast Ferry International, April 1994)

In the last review of fast ferry activity in Hong Kong, published in the December 1992 issue, FFI reported: "The combined fleets of the nine companies serving Hong Kong total 107 vessels."

Since then, the number of companies has increased by one, a further 28 craft have entered service and another 18 are currently on order. Just one catamaran has been sold, another two have been withdrawn and placed on the market while some of the smaller catamarans replaced on the Hong Kong-People's Republic of China routes have been transferred to other routes around the Pearl River delta.

The fleets of vessels operating from Hong Kong island or Kowloon to Macau have remained relatively static during the period, the only changes have been the introduction of two catamarans by the Hong Kong Ferry Company and the withdrawal of three catamarans by the Hong-Kong Macao Hydrofoil Company.

The biggest development has been the opening last October of an impressive new terminal in Macau which is capable of handling three times the traffic of the previous facility.

However, in 1993 the unthinkable happened - all four companies operating to Macau carried fewer passengers than they had during the previous year.

Far East Hydrofoil's traffic fell 1.77% from 10,583,341 to 10,395,992, Hongkong Macao Hydrofoil's fell 11.09% from 1,926,016 to 1,712,312, Hong Kong Hi-Speed Ferries's fell 12.91% from 942,789 to 821,102, and Hong Kong Ferry Company's fell 3.74% from 572,334 to 550,954. Total traffic was 13,480,360 passengers - lower than that in both 1992 (14,024,480) and 1991 (13,654,111).

Far East Hydrofoil

Commenting on the position at the end of 1993, David Hill, the executive director of Shun Tak Ferries, Far East Hydrofoil's parent company, observed: "The number of passengers declined for the first time since 1975. The overall decline was 3.9%. The previous decline in 1975 was considerably greater at 7.3%. However, the 1993 rate of decline was accelerating late in the year (the rate was 8.8% in December), so it seems that more of the same can be anticipated, at least in early 1994.

A reduction in the rate of traffic growth on the routes had become apparent during the previous year. Writing in the 1992 annual report of Shun Tak Holdings, group executive chairman Stanley Ho said, "Our Hong Kong-Macau Jetfoils operations experienced slower growth, likely as a result of a more cautious consumer climate in Hong Kong, where approximately 80% of visitors to Macau reside.

"However, our passenger traffic growth rate increased by more than twice that of the market, which boosted our market share from 72.5% to 75.5%." Elsewhere in the annual report it is revealed, "Total revenue for the Shipping Division grew to HK$1,104.9 million, an increase of 11.3%, while profits before tax increased by 23.8% to HK$390.3 million, or 72.2% of total Group profit before tax for 1992.

"The 1991 Gulf War and the continuing worldwide recession took its toll on tourism in the region and consumerism in Hong Kong, which in turn affected sea traffic between Macau and Hong Kong. Total passenger traffic on the route increased by a slight 2% compared to 4% in 1991. Nonetheless, the Division increased its market share by 3% at the direct expense of its competitors. Passenger volume in the Division's core Jetfoil operations also increased by a satisfactory 7%, versus 10% in 1991.

"The 16th Jetfoil, *Cacilhas*, was added to the fleet in January 1992 - taking advantage of the enormous demand for seats at Lunar New Year. Seats supplied climbed by 10% while passenger load factor declined somewhat to 80% from 82% in 1991 .

"Average ticket value increased by 5% to HK$93.67 from HK$89.23 while the average number of trips made per day grew to approximately 135 from 123. Fares were last increased, in July 1991, by 10%.

"Proposed increases in 1992 were postponed by order of the Macau Government, which in January 1992 imposed a MOP20 [HK$20] departure tax per head. On 1st February 1993 fares were increased by an average 9%.

"In May 1992 the Division commenced sales of duty free goods on board all Jetfoils, which has proven both popular and profitable from the outset. On board advertising using poster and illuminated panels was also introduced.

"Direct operating costs increased mainly as a result of rising Jetfoil crew and engineering labor costs. Despite rising staff costs, repair and maintenance continue to be carried out most cost effectively, and with greater quality control, by in-house engineers.

"Significantly, as a percentage of ticket revenue, direct operating costs before interest charges actually decreased, from 56.4% in 1991 to 55.1% in 1992. Fuel and oil expenses declined slightly, accounting for 24% of direct operating costs compared to 26% in 1991. Fuel pricing is based on

Singapore average mid-spot prices which as a rule hover at approximately US$5 above the price of crude oil.

"Construction of two custom high speed passenger craft in Shanghai is slightly behind schedule. These will enter service in 1994 and 1995, and will closely match the fleet's latest model Jetfoils in terms of speed, ride quality and seat configuration.

"Seats on all 16 Jetfoils will be replaced during 1993, at a cost of approximately HK$25 million, incorporating state-of-the-art materials and advanced safety features, and providing greater leg room in the First Class section. Capacity will be increased by 7%, from 268 to 287 seats, with no increase in overall weight.

"Interiors of older craft will also be upgraded in mid-1993. Today's fleet is on the whole relatively young, the average age of our Jetfoils is 15 years, which is half of their expected life.

"During the year, the Group formed a wholly owned subsidiary, Shun Tech Laboratory, to facilitate in-house engineering research and cost-effective fabrication of advance technology spare parts for Jetfoils. A new digital automatic ride control system has been designed and is being tested for the new high speed craft now under construction.

The next vessel to join the Far East Hydrofoil fleet will be the first of two PS 30 hydrofoils ordered from the China State Shipbuilding Corporation. The completion of this has also been delayed by difficulties in producing the bow foil and it is now scheduled to be delivered in September. (Editor's Note: PS30 is a Jetfoil built in China.)

A more dramatic departure from the standardized fleet that the company has operated since 1982 will take place next year when two Kvaerner Fjellstrand FoilCat foil assisted catamarans are introduced.

The exact specification of the vessels, which are both due to be delivered in May, is still being discussed but they will be smaller than the 40.5m prototype launched in 1991. Equipped for 407 passengers, they will feature a new lighter weight propulsion arrangement, although the principal components of twin General Electric LM 500 gas turbine modules, supplied by Kvaerner Energy, and waterjets will remain the same.

THE MILITARY SCENE IN JAPAN

(From PROCEEDINGS, March 1994)

The severe recession has cut defense - and naval - spending. At the end of 1992, the 1991-1996 Japanese defense plan was revised; it was to increase by 2.1% per year, rather than the previously planned 3%. The fiscal year 1994 budget actually increased only 1.95% over that for fiscal year 1993, the smallest increase in 33 years (the Finance Ministry wanted no increase at all, and there is public pressure for reductions).

Under the revised plan, the Japanese Maritime Self Defense Force will get a total of eight - rather than ten - 4,400-ton destroyers; five rather than eight P-3Cs; and 31 rather than 36 SH-60J helicopters. Planned submarine procurement, however, remains steady at five. The destroyer force will shrink to 16 ships: eight high-end ships (four *Kongo*-class and the four existing helicopter-carrying destroyers) and eight of the new 4,400-tonners, the first of which is scheduled to become operational around 1997.

The fiscal year 1994 draft plan called for buying two 4,400-ton destroyers armed with point-defense missiles; one 2,700-ton submarine; two 500-ton coastal mine countermeasures craft; one 5,600 ton mine countermeasures support ship - considerably larger than the 3,000-ton ship initially planned - with a large helicopter deck for MH-53Es; **one 50-ton hydrofoil missile boat**; and seven yard craft. In addition, Japan has ordered two U.S. air-cushion landing craft (LCACs) for the 8,900-ton landing platform, dock, ordered in the fiscal year 1993 budget. The naval aircraft request included one P-3C, one UP-3D, and eight SH-60J ASW helicopters.

SUMITOMO

The U.S. Navy has given up on its hydrofoils—but the Japanese just commissioned two vessels that will be the nucleus of a division of modified *Sparviero*-class guided-missile patrol boats.

The service's first **two missile hydrofoils** were commissioned on 22 March, replacing conventional torpedo-armed patrol boats; they constitute the nucleus of a **hydrofoil division** that will be based on Hokkaido.

NEW RANGE OF GEARBOXES DEVELOPED BY CINCINNATI GEAR COMPANY

(From Fast Ferry International, January-February 1994)

A new range of marine reduction gearboxes for gas turbine powered fast ferries and patrol boats has been developed by the Cincinnati Gear Company. According to the company, the new range, known as the MA series, "is based upon standardized configurations of proven Cincinnati Gear turbine powered epicyclic and parallel shah gearboxes.

"The MA series was developed to provide users of gas turbines with high performance marine gearing with quicker delivery and lower cost than custom designs. Designs exist for epicyclic and dual input parallel shaft configurations

for most gas turbines from 1,000 hp to 33,000 hp.

"All designs feature cast aluminum housings, surface hardened and precision ground gearing and lubricated systems. They also incorporate modular assembly techniques for maximum design flexibility.

"This makes it possible to use one gearbox design in a 'C' or 'Z' drive configuration or to incorporate CODOG or CODAG capability by adding a diesel input module to the standard design."

The Cincinnati Gear Company's gas turbine gearbox activity during the past 20 years has included installations in Jetfoil hydrofoils and United States Navy LCAC hovercraft.

Jetfoils have two parallel shaft gearboxes, each one transmitting 4,000 hp. The company has now supplied more than 100 gearboxes to Boeing Marine Systems and Kawasaki Heavy Industries. These have accumulated over 600,000 operational hours.

Three different gearboxes are produced for the LCAC and a total of eight are installed in each craft to transmit power from four Textron Lycoming TF40 gas turbines to lift fans and propellers. Over 700 gearboxes have been produced for the LCAC program since 1982.

RELIEF FROM THE JONES ACT?

(The following article is from the Passenger Vessel Association's Newsletter "Foghorn", March 1994)

H.R. 3821 & H.R. 3822 In the Hopper On February 9! - At a press conference held February 9, Congresswoman Jolene Unsoeld (D - WA) officially unveiled two bills designed to stimulate the construction and operation of U.S. flag passenger vessels. The measures are cosponsored by 12 additional Members of the House, including the Chairman of the important Committee on Merchant Marine and Fisheries which takes jurisdiction now that they are formally introduced.

The United States Passenger Vessel Development Act, H.R. 3821, would give a U.S. citizen permission to operate a foreign-built passenger vessel of at least 250 gross tons and 175 berths (and is not a ferry) in the domestic passenger vessel market providing that operator contracts to build a vessel of roughly equivalent size in a U.S. ship yard within three years. As written, the operator would have to notify the Secretary of Transportation within one year of his intention to build a vessel and begin construction within three years. While operating in the U.S., the foreign vessel would be required to "comply with all requirements applicable to a comparable passenger vessel that is otherwise documented under the laws of the United States". This includes manning requirements, according to Rep. Unsoeld's office.

A second bill, the United States Passenger Vessel Development Tax Act, was introduced in order to provide tax incentives to build the U.S. vessels required under H.R. 3821. Among the provisions of special interest to PVA are those that would extend the Capital Construction Fund program to operators of all passenger vessels and reduce the depreciation period for passenger vessels to three years. While introduced as a separate measure due to its tax focus, this bill (H.R. 3822) is considered central to the ultimate success of H.R. 3821. Rep. Unsoeld was joined at the podium on the 9th by Congressman Randy Cunningham (R-CA) and Congresswoman Maria Cantwell (D-WA), as well as by representatives of the maritime industry, including PVA. Before a crowd of reporters representing both national media and media from Rep. Unsoeld's home state of Washington, PVA praised Rep. Unsoeld's efforts to forge a coalition that would support incentives to bring large cruise ships back under the American flag. PVA also acknowledged Rep. Unsoeld's support of the small cruise ship industry, which today has many highly successful U.S. companies operating vessels under the U.S.- flag.

Rep. Unsoeld and her staff have worked for months refining the ambitious legislative package. PVA has worked closely with her office during this period and the legislation which has evolved as a result of these discussions and others enjoys widespread support. A preliminary hearing is expected early this spring.

NEW IMO RULES ARE ON THE WAY

(From Marine Log, April 1994)

New amendments to SOLAS, MARPOL and other conventions mean shipowners face significant regulatory changes.

Despite accusations of foot dragging and bureaucratic inertia, IMO (International Maritime Organization) has, over the last few years, disgorged a large number of new shipping safety and antipollution regulations. The system of tacit acceptance, heavily encouraged under the leadership of Secretary-General Bill O'Neil, has already played a major role in accelerating the implementation process. Basically, "tacit acceptance" means that countries that are signatories to a convention will automatically be bound by any changes in that convention unless they specifically opt out.

Over the next 18 months to two years, the tacit acceptance mechanism promises to usher in a large number of amendments to two of IMO's most important conventions those dealing with safety of life at sea (SOLAS) and prevention of pollution from ships (MARPOL). Coupled with changes to the conventions covering training, certification and watchkeeping, etc., these amendments will mean that shipowners will have to comply with a steady stream of new regulations, as flag and port states implement the convention requirements through their own national legislation.

HIGH SPEED CRAFT

In proposing the addition of a new SOLAS chapter on high speed craft, IMO has recognized the special needs of these vessels. The high speed craft code (HSC) will apply to high speed craft on international voyages that do not proceed for more than four hours at operational velocity from a place of refuge when fully laden. It will also cover cargo craft of 500 gross tons and above which do not go more than eight hours from a port of refuge.

WELCOME NEW MEMBERS

Martin C. Grimm - Martin is employed by the Australian Dept. of Defence, and an enthusiast of hydrofoil craft. He is currently trying to find hydrofoil enthusiasts in Australia to help purchase, restore and display "Manly". (See article on p 5).

Jay A. DeVeny - Jay is a Project Engineer employed by Maritime Applied Physics Corp., in Laurel MD. He is heading up the Hydrofoil Small Waterplane Area Ship (HYSWAS) project there under a Small Business Innovative Reasearch contract from the Carderock Division, Naval Surface Warfare Center.

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EXCERPTS FROM RECENT BOARD MEETINGS

The IHS Board of Directors wants to share with its fellow members some of the events in connection with the Board's effort to initiate commercial High Performance Marine Vehicle passenger and light freight demonstration projects in the U.S.

At the March Board Meeting: J. Meyer briefly reviewed the status of the effort to stimulate Congressional action leading toward appropriation of funds to support HPMV demonstration projects in the U.S. John Monk, Jim King, and Mark Rice have volunteered to contribute their services along with Cam Mixon on the Congressional Liaison Committee.

J. Meyer had contacted Jack Offutt, President of the U.S. Hovercraft Society (USHS), to participate in this effort along with SNAME SD-5 Panel. Jack Offutt planned to meet or call the USHS Board members to obtain their reaction. Ken Spaulding pointed out again that the SD-5 Panel must maintain a non-advocacy position. Bill Rogalski was continuing his work aimed at a "White Paper" on HPMVs.

Mark Rice had drafted a series of charts for presentation purposes which can serve as a draft for support of HPMV demonstration projects in the U.S. He mentioned that the Technology Reinvestment Program (TRP) had $400M in FY93 and another $400M in FY94 to build on the FY93 projects, and another $700M in FY95. Mark pointed out that support of a "shipyard" will be necessary because of cost sharing aspects of TRP. Wade Webster mentioned MARITECH program and the possible tie-in thru it. Mark emphasized the need to contact ARPA since they would be the ones to channel funds. Bob Schaffran (from the David Taylor Research Center) is at ARPA heading up the MARITECH Program.

Jim King had prepared draft presentation material which was reviewed. Ken Spaulding is to make this entire topic the main thrust of the SD-5 Panel meeting on May 2. John Meyer is to contact Becki Berg of the Passenger Vessel Association since Marty Pilsch mentioned that she has an interest in this area and also has good Congressional contacts.

At the April Board Meeting: Becki Berg of the Passenger Vessel Association (PVA), and Jack Offutt of the USHS were invited to this meeting.

Mark Rice, as an introduction to our activities and objectives for Becki Berg and Jack Offutt, summarized background leading to the HPMV initiative we want to propose to ARPA. Becki discussed the makeup of the PVA.

Mark Rice recommended that the HPMV Initiative be presented to ARPA since they are the organization who presumably would handle the execution of the program if Congressional action is ever obtained. The possible role of Bob Schaffran, based on his current role in ARPA (MARITECH) was discussed. John Meyer has passed him and Wade Webster an info package on our initiative and activities. Becki Berg commented that Bob Schaffran made a presentation at their PVA Florida meeting earlier this year where he emphasized manufacturing technology.

As we attempted to define to Becki what we really were trying to accomplish it was clear that our objectives weren't very clear. She asked some very pointed questions, and as our status and goals emerged, she proceeded to provide some real insights into the politics of marketing a technology, followed by some specific recommendations and contact names. As she came to understand the message we were trying to convey she warmed to the message and essentially said that we had something to say that would be well received, and quite possibly supported - if we could get our act together, and clearly articulate our message. The following summarizes her message to us.

There are a number of avenues and vehicles for accomplishing our objectives. The TRP/MARITECH (the ARPA route) is clearly promising, and is the initial target of the proposed presentation. The roles of the U.S. Commerce Department, National Institute of Standards and Technology were mentioned. Becki advised that to be successful, a proposal must show that the program will: (1) create jobs and (2) provide a marketable (U.S. or foreign) commodity.

The '94 TRP competition is over but there are 3 more years of funding and the process of proposing will reopen in November. The "coalition" approach was stressed and American Waterways Operators (AWO) mentioned. Tim Colton, a private consultant, was referred to as someone who has worked with AWO.

Becki asked: "Why, if Fast Ferries were so great, and available, nobody here was using them!?". The answers included cost, risk, regulatory impediments etc. We stressed that we felt that the potential of AMVs, as evidenced by the European and Asian experience, was not being conveyed to decision makers. She said that the vehicle operator community was really quite sophisticated and that they knew what was going on in the world. The annual passenger ferry conferences are well attended. She said that if there are misconceptions, in the U.S. community, regarding risks, costs etc. for AMVs, then setting this record straight was surely a legitimate role for the group.

The upcoming (September 1994) International Ferry conference in Bergen, Norway, sponsored by the International Marine Transit Association, was cited as an opportunity to get our message out to an international group. We should definitely brief Martha Reardon, Secretary-Treasurer, before hand.

The PVA annual meeting will be in San Francisco in January 1995. Becki said that a presentation by our group at that meeting could be effective and would surely be welcomed. The latest issue of the PVA publication (Foghorn) was passed around. Becki noted that this contained an article on the "World SWATH" describing planned ferry operations in Florida. Becki noted that a new transportation bill was being introduced in Congress. It is now 1 page, and would become more than 100 pages soon, with the many possible additions anticipated. Becki provided a list of 18 questions which had to be answered to have a credible position for obtaining legislative action on this subject. This list of questions was associated with legislation regarding the National Highway System-Public Works Committee, Surface Transportation Office [Tel (202) 225-9989].

Becki recommended that we need to "elevate the awareness" in Congress regarding our subject - and, as we approach prospects it may be desirable to ask their help in learning how to exert our influence. We would be essentially making them a party to our cause. We should "engage them in the process".

Becki stressed the role of the Washington State Ferry Authority, and suggested that we might collaborate with the Washington State Group and, say, Nichols Brothers to get funding in a Highway Bill. She said that the Seattle Congresswoman, Maria Cantwell was a strong ferry supporter. Her Administrative Assistant is **Lisa Piccione** who is approachable and must be on our briefing list.

Becki recommended that we contact and brief **Ken House** (Tel. No. (202) 225-9899), who is on the congressional staff of the Transportation and Public Works Committee, House of Representatives. We should make a specific proposal to get funding, possibly in a highway bill.

The Ferry subcommittee of Transportation Research Board (TRB) is also a very important target for our message. We have established contact with George Cancro. They could be an excellent vehicle for either funding or cooperating in studies.

At the May Board Meeting: Jack Offutt and John Durkin of the USHS were invited to attend this meeting. John Durkin has replaced Bill Rogalski on the SNAME SD-5 Panel heading the Committee on the commercial HPMV initiative.

As a result of the last IHS Board meeting and the SNAME SD-5 Panel meeting, Jack Offutt, Mark Rice and John Meyer met with ARPA personnel Bob Schaffran and Andrew Dallas on 4 May. Although the viewgraphs previously prepared were not used, their content was informally discussed. As a result, Bob Schaffran was receptive and supportive of the Commercial HPMV Initiative being proposed as part of the MARITECH program. He felt that CDNSWC could be helpful in several areas - namely, evaluating proposals to ARPA involving HPMVs, and a Workshop on this subject in the Fall of 1994. The workshop on HPMVs would be an efficient way of getting together designers, builders, operators, and financiers all in one place at one time to discuss the subject. This workshop could be one element of a longer range plan that puts the IHS, USHS, and SNAME SD-5 Panel into the "educational business". As a result, CDNSWC had responded with a letter offering to further pursue both of these areas.

Ken Spaulding presented the AMV Video story board which had been presented at the SNAME SD-5 Panel meeting on 2 May. The Board was requested to review and comment.

Jim King suggested that the name "Congressional Liaison Committee" be changed as the audience for the Commercial HPMV Initiative involves others including operators, builders, and the financial community. Also, it does not appear to be within IHS resources to lobby Congress, hold breakfasts for congressional aides, etc. Jack Offutt suggested that if the builders and the operators became enamored with the initiative, they will have the means and contacts to perform the Congressional Liaison function.

At the end of the discussions, it was agreed that John Durkin would put together a strawman "Big Picture" strategy encompassing the ARPA Workshop. This would then become the plan for the three organizations and CDNSWC in pursuit of the "Initiative".

At the June Board Meeting: John Meyer, reviewed the events of the last few months of work by the Board and summarized the recent history, noting the efforts to save the PHMs and the subsequent alliance with USHS and SD-5. He mentioned the tri-sponsored ("Troika") dinner with Marty Pilsch of the Urban Harbors Institute as speaker, the King/Rice ARPA proposals and the subsequent meeting (4 May) of Meyer, Offutt and Rice with Bob Schaffran and Andy Dallas, the ARPA MARITECH Program Manager and Deputy. John Durkin had been assigned by DTRC to pursue a support agreement with ARPA which would include a possible AMV oriented workshop and general technical support. John Durkin would also represent IHS, USHS and SD-5. Durkin is now "officially" heading the SD-5 subgroup handling this area.

It was noted that Frank Peterson, of DTRC, was gathering extensive AMV information during his 6-month assignment to ONR Asia in Tokyo. Frank has visited China, Korea, Hong Kong and Singapore and is currently in Australia for two weeks.

There was an extended discussion of the proposed ARPA workshop, it's objectives, content, participants and timing with respect to the Broad Area Announcement (BAA). Bill Erickson pointed out that for a November BAA the workshop really should have been scheduled this summer in order to prepare the proposers for the BAA content and allow them to form consortia for cost sharing. Bill noted that perhaps this workshop would support the FY96 program rather than the FY95 program.

Ken Spaulding noted that there was some confusion regarding "who is in charge" and who is actually committed to supporting this current ARPA initiative. The nominal lead has shifted from Cam Mixon as head of the IHS Congressional Liaison Committee to John Durkin since John is chartered and funded for action. If this is the case then the current "organization" needs to be officially recognized, Durkin's leadership acknowledged, and specific

IHS, USHS and SD-5 support for Durkin committed. There was a consensus that Durkin should lead the effort and that commitments for his support should be made. John Meyer took an action to discuss this with Jack Offutt regarding USHS agreement and support.

Bill Erickson said that having a Congressional "listening post", not necessarily an "action" committee, was still very critical. Capt. Erickson volunteered to take on the chairmanship of this committee to track Congressional items that may be of interest to our members. In his job as the Shipbuilding and Conversion, Navy Appropriation Manager, he is in a position to monitor what is happening on the DOD budget request, etc. for FY95. Bill will also be watching the progress on the Passenger Vessel Act, the Merchant Marine Revitalization Act of 1994, Shipbuilding Trade Reform, MARITECH and other items before this session of Congress.

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DOD ANNOUNCES COMPANIES SELECTED FOR MARITECH PROGRAM

On May 25, 1994, Deputy Secretary of Defense John Deutch announced the selection of 20 projects for negotiation as part of the Administration's MARITECH program. These projects were selected from a total of 34 proposals received during the FY94 competition, and represent 147 participants located in 22 states and 9 foreign countries. Sixteen major U.S. shipbuilding companies are included.

President Clinton announced MARITECH in October 1993 as part of his plan to improve the international competitiveness of the U.S. shipbuilding industry. It is an industry-led, industry-driven, five-year effort funded and managed by the Department of Defense's Advanced Research Projects Agency, in consultation with the Maritime Administration. In addition, MARITECH is being executed in full partnership with the Navy, through the Office of Naval Research. Funding for FY94 is $30 million; over five years, the anticipated total government funding is $220 million. Because all government funding is at least matched by participants, the program's total impact will amount to $440 million for U.S. industry.

The MARITECH program will award matching federal funds to develop and implement technologies and advanced processes for the competitive design, marketing, production and support of commercial ships. Today's projects include a broad selection of ship types: double hull tankers, passenger vessels, dry and bulk cargo vessels, container ships, high-speed ferries, and off-shore service craft. The effort has two phases; today's selections are for the first phase, which is focused on near-term market penetration. Subsequent efforts will focus on longer-term technology development.

"MARITECH addresses a very important issue for the Defense Department and the nation. We must find ways to maintain our shipbuilding industrial base in a time when Navy shipbuilding is on the wane," noted Deputy Secretary Deutch. "This program offers shipyards the opportunity to make the changes required to become competitive in the international market."

The MARITECH program is a key component of the Administration's defense conversion initiative. It will help shipyards make the transition from the military to the commercial market. With the end of the Cold War and the drawdown in defense spending, many shipyards that have supported the military are in a critical business situation where there are not enough orders to preserve the U.S. shipbuilding industrial base. This program will help keep the industry healthy by helping them make the necessary changes to become commercially competitive in the international shipbuilding market.

As was expected, the ship-types most often proposed were tankers for the international market. In addition, there are some proposed high-technology ships that may generate new market opportunities. Some of the more innovative proposals for all ship types suggest shipyard partnerships which partnering yards co-market and co-produce the ship, with different parts of the ship being built in each of the yards, an approach that is a breakthrough in shipyard cooperation.

Several awards of interest are:

Commercialization of Planing SWATH Technology - Halter Marine, Inc., of Gulfport, Mississippi, part of the Trinity Marine Group, proposes a 24-month project for commercialization of planing SWATH technology. This innovative vessel design concept (planing SWATH), in combination with associated advanced construction technology, has the potential for global sales on a large scale. The integration of two technologies — planing craft and SWATH — in target markets such as ferries offers the opportunity of making small- to medium-sized marine craft faster in rough seas, more seaworthy, and more cost effective than current craft. The project consortium includes Semi-Submerged Ship Corporation of Solano Beach, California; Connell Finance Company, Inc., of Westfield, New Jersey; and Hornblower Development Corporation of San Francisco, California. Approximate fiscal year 1994 government funding is $300,000, subject to negotiation.

Development of SLICE Fast Passenger Ferry Design and Comprehensive Marketing Plan - Pacific Marine & Supply Company, Ltd., of Honolulu, Hawaii, proposes a 36-month project to develop the design of a commercial high-speed ferry based on U.S. Navy-developed SLICE hull form technology. This hull form offers a combination of high speed and excellent stability in heavy seas. These characteristics make it ideal for use as a high-speed ferry in open waters such as those in the Hawaiian Islands. The construction of these vessels will use advanced aluminum extrusion techniques to reduce construction time and cost. The proposers plan to conduct an extensive market survey and project a large international market for this type of craft. The team includes Lockheed Missiles & Space Company of Palo Alto, California; Textron Lycoming of Stratford, Connecticut; MacKinnon Searle Consortium, Ltd., of Alexandria, Virginia; KaMeWa of Sweden; and Schichau Seebeckwerft of Germany. Approximate FY 1994 government funding is $400,000, subject to negotiation.

THE NEWSLETTER

INTERNATIONAL HYDROFOIL SOCIETY

Post Office Box 51, Cabin John, Maryland 20818, USA

Editor: Robert J. Johnston | AUTUMN 1994 | Co-Editor: John R. Meyer

IN THIS ISSUE.....

MEETING ANNOUNCEMENT

JOINT MEETING OF IHS, SNAME SD-5 PANEL, AND U.S. HOVERCRAFT SOCIETY

NOVEMBER 10, 1994

FORT MYER OFFICERS CLUB, ARLINGTON, VIRGINIA

CHAFFEE ROOM

5:30 PM Cash Bar - 7:00 PM Dinner - 8:00 PM Program; $19.00 Per Person

Menu- Soup, Choice of Breast of Chicken or Broiled Red Snapper, Vegetables, Baked Alaska, Coffee

Make reservations and choice of menu no later than November 7 if you plan to attend. Call one of the following:

John R. Meyer 301-227-1796; Patsy Jackson 703-329-0102; Kathy Pellicci, 301-227-1177

PROGRAM

RIDE CONTROL - THE INTERNATIONAL MARKET

John D. Adams, Vice President, Maritime Dynamics, Inc.

Maritime Dynamics, Inc. was founded in 1972 to provide engineering support to the Department of Defense for research, development, test and evaluation of advanced marine vehicles. In 1984, the company started delivering motion control systems for high speed commercial craft, and today hardware for high speed craft accounts for over 75% of the company's business. MDI has installed motion control systems in 31 SES, 15 ACVs, 4 SWATH, 14 catamarans, and 3 monohulls. In addition, MDI has developed and delivered machinery alarm and monitoring systems, acceleration monitoring equipment, and lift fans.

John Adams will talk about the trials and tribulations of selling, designing, building, commissioning, and servicing motion control equipment in light of some of the not-so-romantic realities of the worldwide high speed craft industry.

THE PRESIDENT'S COLUMN

The Summer 1994 Newsletter had an announcement about planning for a possible celebration of the Society's 25th Anniversary. A committee has been established and is spearheaded by Mark Bebar and George Jenkins. They designed a questionnaire which has been sent to all IHS members. You should have received it, and hopefully you have responded as positively as you could. In so doing, you had the opportunity to tell the Board of Directors how you felt about such a celebration. As of this writing, about 30% of our members have responded. Although the "deadline" of 30 September has passed, please continue to send in your comments on the questionnaire form, particularly if you can attend such a celebration in the Washington, D.C. area in the May-June 1995 time frame. The 25th Anniversary Committee is currently assessing the questionnaires, and a decision by the Board of Directors will be made shortly.

The IHS has received a copy of the Urban Harbors Institute three volume report on the subject: "Assessment of Ferries as an Alternative to Land Based Transportation". Ken Spaulding had summarized Marty Pilsch's talk on this subject in the Summer 1994 Newsletter. In addition, an excerpt from the report documentation page is provided on page 3 of this Newsletter.

The Board regrets to inform its members that Cameron Mixon has submitted a letter of resignation from the IHS Board of Directors. Due to a recent job change, Cam feels that he will not have sufficient time to devote to Board duties. All of us join in thanking Cam for the time and effort he has given to the IHS over the last several years.

Your attention is called to the short article on page 9 describing the Kawasaki Techno-Superliner development in Japan and a picture of the vehicle. Only limited information has been made available to date. Your editor would appreciate it if any of our members have additional data that could be passed along.

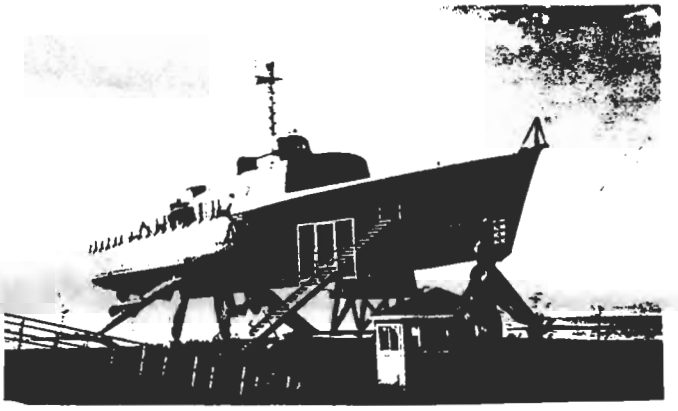
Frank Peterson, of the Carderock Division, Naval Surface Warfare Center, has recently returned from a six month assignment in ONR's office in Tokyo. During that time he has had the opportunity to visit fast ferry builders facilities and ferry operators in the entire Pacific Rim. Frank has contributed many articles and sent back to us a wealth of interesting information on developments of high performance marine vehicles in that part of the world. His report to ONR, reproduced on page 11 of this Newsletter, provides the flavor of his experiences during his assignment. Many thanks again, Frank!

Again, the IHS along with the U.S. Hovercraft Society and the Society of Naval Architects and Marine Engineers (SNAME) Ship Design (SD-5) Panel on Advanced Marine Vehicles is planning a "Troika" meeting in November. Please see the announcement on the cover page of this Newsletter. We hope that IHS will be well represented by many of its members in the Washington, D.C. area.

John R. Meyer, President

BRAS D'OR ON DISPLAY

While on vacation this summer, Phil Yarnall and his family came upon a small maritime museum (Musee Maritime Bernier) across the river from Quebec, Canada. On display, and open to the public during certain hours, was the FHE 400 (BRAS D'OR) pictured here. Unfortunately the museum was closed when Phil arrived and he was not able to tour the ship. The exterior appeared to be in excellent condition.



To put this picture of the FHE400 in perspective, the ship had a full load weight of 200 tons, a length of 151 ft., a hull beam of 21.5 ft., and a foil span of 66 ft. Foilborne propulsion was provided by a Pratt & Whitney FT4A-2 gas turbine engine rated at about 22,000 hp. A Paxman 16 YJCM Diesel engine supplied hullborne power.

She was designed by DeHavilland, completed in 1967, and arrived in Halifax, Nova Scotia on 1 July 1968 to begin a long series of trials. From September of 1968 until July 1971, when the trials terminated, the ship logged 648 hours, 552 hullborne, and 96 hours foilborne. The most operationally representative trial was a 2,500 mile voyage to Hamilton, Bermuda, and Norfolk, Virginia, in June 1971. Foilborne, BRAS D'OR exceeded her calm-water design speed, achieving 63 knots at full load in 3 to 4 foot waves.

The Canadians are to be congratulated for saving this glorious ship from the scrap pile.

Mike Terry, one of our Seattle members, has suggested retrieving PLAINVIEW from the mudflats, and restoring her in the same fashion as the Canadians have the BRAS D'OR. Sounds like a great idea Mike! You should find lots of sympathizers in the Northwest who would help.

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FAST '95 - A Call for Papers has gone out for FAST '95. The Conference will be in Lubeck-Travemunde, Germany, 25 through 27 September 1995. Deadline for submission of abstracts is 30 November 1994. Direct inquiriesto:

FAST '95
Technische Universitat Berlin
Institut fur Schiffs-und Meerestechnik
Salzufer 17/19
D-10587 Berlin, Germany
Attention: Prof. Dr. C.F.L. Kruppa
PH: 49-30-3142 3411; FAX: 49-30-3142 2885

ASSESSMENT OF FERRIES AS ALTERNATIVES TO LAND BASED TRANSPORTATION

In the Summer issue of the Newsletter, Ken Spaulding had summarized a talk on this subject given by Martin C. Pilsch (of the Urban Harbors Institute) at the April joint meeting of the IHS, USHS and SNAME SD-5 Panel organizations. In August, Marty Pilsch informed us that the report entitled: "Assessment Of Ferries As Alternatives To Land Based Transportation" had been released by the Department of Transportation. Excerpts from the "Documentation" pages are reproduced here for the benefit of our members. The authors were: Charles R. Norris, Urban Design and Transportation Planning Consultant, Cambridge, MA and Urban Harbors Institute, University of Massachusetts, Boston.

Purpose: To assess the current and future uses ferries as alternatives to landbased transportation modes. Phase 1 consisted of a survey of 25 routes and systems in the U.S. to identify locations where ferry services have been used to provide an alternative to bridges, tunnels, highways or rail routes. From the list of 25 systems, five representative networks were selected for Phase 2 case study analysis. Phase 2 consisted of a detailed case study analysis to determine in more depth the various choice factors for providing water-based alternatives as well as user preferences for selecting ferries over land-based options. The analyses consisted of document research and site visits to assess the history, context, operations, landside options and other unique factors contributing to mode development and choice.

Method: Phase 1 was conducted by document search, phone interviews and personal experience of the author. Phase 2 included detailed document search and review, site visits and interviews, data compilation and draft and final reports. Since there is little comparative or descriptive literature available on the various routes studied, the site visits and interviews proved invaluable.

Results/Findings: Phase 1 findings included identification of typologies of ferry service, general decision factors, and documentation and categorization of system by type and characteristic. All services tended to be multi-functional to varying degrees with the majority focusing on passenger and vehicle transport, and most serving tourism and recreation needs as well. Public transportation services ranged from lifelines serving islands, to through traffic marine highway links, to commuter vehicle transfer, to passenger commuter transit functions. Phase 1 concluded by identifying 5 representative networks as case studies for Phase 2, including ferries serving Seattle WA, Portland ME, San Francisco CA, New Orleans and the Mississippi River, and New York City.

Phase 2 case studies were evaluated in much greater detail, with a focus on characteristics such as system historical decision points, assessment of effectiveness of water routes compared to land-based alternatives, and future plans for expansion. Each system was found to have distinguishing features relating to operations, vessel technology, planning methods, environmental factors, and institutional settings. The case study locations were selected to represent a range of waterbody types, geography, climate, navigational conditions and other factors influencing route definition. Three basic ferry transportation functions were identified: 1) essential services to islands or other locations without landbased alternatives, 2) complementary services where ferries provide more efficient routes than land-based alternatives, and 3) optional services where ferries compete with land-based alternatives but provide qualitative advantages to attract riders.

All services were found to provide significant contributions to their regional transportation networks. Seattle and the Washington State Ferry System provide the largest volume passenger and vehicle system in the U.S., acts as a major tourist magnet to the Northwest, and provides a variety of complementary and essential services. The Portland-Casco Bay system is a classic example of an island lifeline type service, and is used year round by commuters, also serves seasonal vacationers, and provides essential services for which there are no landside alternatives. San Francisco's Golden Gate Ferries set the precedent for contemporary fast ferries serving as alternatives to expanding landside highway and bridge infrastructure in the 1970's, introduced the first high speed catamarans in the 1980's and plans expansion of routes with the next generation of faster vessels for even longer routes, while providing complementary services. The Mississippi River and New Orleans vehicle/passenger ferries continue to serve as "ferry-bridges" connecting residents with employment across the river, reducing auto trips with complementary services to the infrequent bridge and highway network. New York commuter ferries provide attractive options to the congested and unpredictable routes into Manhattan, with an innovative use of private passenger ferry links serving key commuter corridors, and helping to relieve pressure on the road, tunnel and rail systems.

Conclusions and Recommendations:

1. Ferries are providing cost-efficient and environmentally compatible alternatives to land-based transportation in many regions of the country.
2. Ferries are filling increasing new roles as links in intermodal transit and vehicle links across water, and are serving as integral components of regional transportation networks.
3. The number of ferry services have increased significantly in urban areas in the past decade with commensurate increases in volume of users.
4. Ferry use for recreation and tourism has also increased during the same time frame often on the same routes and systems.
5. Lower volume, essential services continue to provide important lifeline transportation functions for island communities.
6. Complementary and optional services in urban areas appear most likely to grow by relieving pressures on landside infrastructures filled to capacity.
7. Emerging new high speed vessel technologies will provide new more competitive longer distance route

options in many areas.
8. A National Ferry Policy is recommended to recognize the expanding role of ferries as key links in intermodal regional transportation systems, and to provide expanded federal assistance through emerging Intermodal Surface Transportation Efficiency Act (ISTEA) programs.

All three volumes of this report are available from NTIS (703) 487-4650.

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WESTAMARIN FOILCAT 2900 SHIPPED TO INDONESIA

(From Fast Ferry International, May 1994)

The FoilCat 2900 foil assisted catamaran completed by Westamarin West in 1992 was shipped from the Norwegian company's Mandal yard earlier this year and was due to enter service in Indonesia last month on a route in the northern part of the Strait of Malacca.

Westamarin's Swedish parent, Swede Ship Invest, has recently formed a joint venture company, Swede Ship Intilintas with PT Pelayaran Intilintas Tirthanusantara, a Jakarta based company that represents the Swede Ship group in Indonesia.

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WESTAMARIN FOILCAT 3000 ORDERED FOR ROUTE IN ASIA

(From Fast Ferry International, June 1994)

The Singapore based Paciro Group has ordered a Westamarin FoilCat 3000 foil assisted catamaran from the Swede Ship Group and taken an option on a second vessel. Deliveries are scheduled for the summer and autumn of 1995.

According to Swede Ship, "The new building is intended for a route in the growing fast ferry market in South East Asia." The FoilCat 2900 launched by Westamarin West in 1992, recently entered service on a route across the Strait of Malacca between Indonesia and Malaysia.

The FoilCat 3000 is a similar design but can carry up to 200 passengers, approximately 20% more than the earlier craft. Performance figures, a service speed of 45 knots and maximum speed of 50 knots, are identical.

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MORE ON NORWEGIAN FOILCATS

(Maritime Reporter, August 1994)

European builders of fast ferries are enjoying a significant number of orders in 1994, orders often for brand new designs. The ferry sector's lagging renewal rate, which leaves it open to criticism on issues of public safety, has been an impetus for the upturn in business. Economics are, however, at least equally critical.

As the average age of a ferry in the world fleet is 17 years, such vessels fall into the greatest "ship losses" category, according to the 1993 European Community White Paper on ship safety. Consequently, some of the vessels fall into the undesirable insurance arena of penalty premiums, and even outright refusal of coverage.

With costs still in mind, operators have learned that passengers will pay higher fares for faster service, so it makes sense to opt for the bigger, swifter replacement ships. Whether an owner selects catamaran, monohull, SWATH, SES, hovercraft or one of the vast range of hybrids—which total up to over 80 available international types that have at least reached design stage—one thing is for certain: it's time to think newbuild.

Kvaerner and fellow Norwegian rival Westamarin have been working along similar lines in the development of foil assisted catamarans.

The launch in 1991 of a 131-ft (40-m) waterjet propelled, gas turbine-driven prototype at first seemed to indicate that Kvaerner had gotten there first.

However, technical glitches were reportedly addressed and solved, and the company has concluded a contract with Far East Hydrofoil Co. for two 115-ft. (35-m) versions with a 407-seat configuration.

Westamarin's FoilCat 2900, launched a year later, uses diesel engines and the Ulstein-Liaaen Z propeller system. Its foils achieved remarkable lift and the vessel made 50 knots from day one with an extremely smooth ride thanks to a sophisticated ride and bank control system.

However, with capacity for only 160 seats in a single open-plan saloon, it proved unconvincing despite a massive sales effort from parent company Swede Ship.

Nevertheless, within the space of a single month Westamarin shipped the original 2900 to Indonesia for operation across the Strait of Malacca and received an order from Paciro in Singapore for a FoilCat 3000 with an option for a second. This slightly larger version can carry 200 passengers with a top speed of 50 knots and a service speed of 45 knots.

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KVAERNER FIELLSTRAND FOILCAT UPDATE

(From Fast Ferry International, June 1994)

Although it might look like it, the FoilCat 40m foil assisted catamaran is not just a Flying Cat fitted with stainless steel foils and gas turbine engines. The length overall is similar, but the 12.0m beam of the FoilCat is almost two metres wider than that of the Flying Cat and, of course, there are significant differences in the hull lines.

The research programme had started in 1987 but far more development than had been anticipated was needed following the launch of the prototype four years later.

Numerous problems were encountered: the hull was too heavy, the foils were producing too much drag and not enough lift, the propulsion system was not delivering enough thrust, cavitation was expenenced in the waterjets. During initial testing the vessel would not take off.

An extended development and trials programme, which included specialist consultants on non-marine related aspects, had to be undertaken. One major change was a redesign of the foils. One highlight was the trouble free operation of the Flight Control System, part of which was adapted for the Motion Dampening System on the Flying Cat.

By November last year, however, Kvaerner Fast Ferries felt comfortable enough with the project to conclude a

contract with Far East Hydrofoil Company for two FoilCat 35m vessels. Both are due to be delivered in May 1995.

The company is now offering two FoilCat versions, a 35m vessel able to carry up to 420 passengers and a 40m vessel able to carry up to 300 passengers. The size and capacity mixes are dictated by the maximum possible operating weight of the design.

Bent Hammel is not expecting more orders to be confirmed until the FoilCats have entered service on the Hong Kong Macau route though. In an ideal world, as he puts it, he would like to see five a year being built at Omastrand but he admits that the design has a niche market due to its high cost, the quoted price of the Far East Hydrofoil contract was US$40 million, and its relatively high work capacity.

The 40m vessel is equipped with 292 seats in a very luxurious configuration. In the main deck saloon there are 214 Nova 400 and 1400 seats plus a bar, duty free shop, pantry and four toilets aft.

The upper deck saloon has 74 Nova 1400 and Strada seats, three toilets forward and a bar aft. Between the wheelhouse and the upper saloon a crew area is fitted out with a rest room, changing room and toilet/shower.

Two General Electnc LM 500 4,400 kW gas turbines, in modules supplied by Kvaerner Energy, each power a KaMeWa 80 SII waterjet via a MAAG MGO-I 10/2 1:7.3 gearbox. The same engines and waterjets will be installed in the 35m vessels but in a different configuration.

The future of the FoilCat 40m has yet to be decided, during a bleak period of the trials programme it was thought that the vessel might be refitted as a catamaran but now that the problems have been overcome, it is possible that it may be retrofitted with new foils and offered for sale.

The 35m craft will be fitted with a Flight Control System comprising, as Kvaerner Fjellstrand describes it, "motion sensors, three processing units and a single fail safe voting unit". The FCS on the 40m vessel gives a choice of running heights from zero to over a metre. In normal conditions a height midway between the two is selected while in heavy seas the height is lowered rather than raised, so ensuring that the waterjets do not ventilate, and the FCS effectively becomes a Motion Dampening System. The company reports that only a marginal loss of speed is experienced in these conditions.

Far East Hydrofoil has specified a three class seating configuration for a total of 407 passengers on its vessels. On the main deck there will be 147 first class seats forward, plus a VIP room for four people to port, 64 tourist class seats midships and 32 economy seats aft.

The upper saloon will be fitted out with 160 tourist class seats. Facilities for the company's relatively short route will be limited to five toilets on the main deck, three amidships and two aft, and three more aft on the upper deck.

FoilCat Specifcations

	35m	40m
Length overall	35.00m	40.55m
Breadth	12.00m	12.00m
Depth moulded	4.20m	4.20m
Draught loaded		
- Foilborne	2.55m	2.55m
- Hullborne	4.70m	4.70m
Tonnage	450 grt	470grt
Max deadweight	50,000 kg	-
Passengers		
- Main deck	243	218
- Upper deck	164	74
-Total	407	292
Service speed		
- 40.5 tonne load	45 knots	-
- 40.8 tonne load	-	45 knots
Range at Serv. speed	300 n miles	-
Main engines	2 x G. E. LM 500 4,400 kW	2 x G. E. LM 500 4,400 kW
Aux power	2 x 80 kW	-
Watejets	2 x KaMeWa 80 S11/6	2 x KaMeWa 80 SII/6

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HITACHI ZOSEN DELIVERS CATAMARAN

(Maritime Reporter, June 1994)

Hitachi Zosen delivered the *Shoko*, a foil-assisted catamaran of the SuperJet-30 series, from its Kanagawa Works to Ishizaki Steamship Co. Ltd.

The vessel—which measures 103 ft. (31.5 m) long, 32 ft. (9.8 m) wide with a six-ft. (1.9m) draft—is the fifth of the seven SuperJet-30 ships ordered from Hitachi Zosen, and the second to Ishizaki Steamship Co.

The *Shoko* is equipped with a computerized rolling control device in its hydrofoils, with its control effectiveness proven by its reported cruising performance. The *Shoko* is a hybrid-type vessel, with twin hulls equipped with submerged hydrofoils fore and aft. The vessel's weight is supported both by the buoyancy of the two hulls and the lift of the two hydrofoils. The vessel also features a wide deck and spacious cabin.

The computerized automatic control of the flaps attached to the hydrofoils reportedly reduces ship-body motion to about one-eighth that of an ordinary catamaran, ensuring comfort.

The vessel is driven by two diesel engines and two waterjet drives, manufactured by Niigata Engineering Co., Ltd., to a maximum speed of about 38 knots.

THE "CIGAR"

(By Bob Johnston and Jean Buhler)

During the late 1950's, the use of hydrofoils in clandestine, naval operations was evaluated. Some of these operations used hydrofoils purely for rapid sea transportation. For example the old "Beach Jumper" units tested a Supramar design as a personnel mover. This design was a small patrol boat that initially had been designed for the border patrol forces of the French Navy. These boats carried 6 to 7 personnel at speeds in the 30 to 40 knot range. Embarkation at speed was an interesting problem that the "Beach Jumpers" evaluated.

Out of this background a requirement was developed for a device that could be launched from the torpedo tube of a submarine. Such a craft was to be capable of being assembled by two individuals after ejection. The craft was then to travel to a beachhead at a maximum distance of 15 nautical miles at a speed of at least 30 knots, while transporting the two individuals. Near the beach area the craft was to be submerged and its position marked while the swimmers proceeded to shore. Upon completion of the shore operation, which might be as long as two days, the craft was to be retrieved and proceed a maximum distance of 15 miles for a rendezvous with the submarine.

Upon these requirements the basis for a contractual arrangement was established. Miami Shipbuilding Corporation was selected as the designer and producer of the craft and foil system. The outboard marine industry undertook the task to develop a suitable, reliable propulsion unit of 20 to 25 horsepower. Their major task was to produce an outboard capable of lengthy submergence which would then be floated and restarted to transport the swimmers back to the submarine. Also, because of the nature of the intended operation, silencing of the motor, while still producing the required power, was specified.

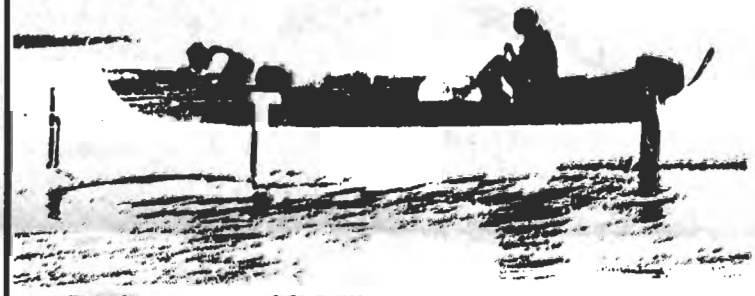
The preliminary design established the power requirements and the basic configuration. The major task of Miami Shipbuilding was to configure a hull, foil and propulsion system that could be placed within a 21 inch diameter torpedo tube. The resulting configuration was a three submerged foil arrangement-two incidence controlled 18 inch span, tapered, swept back foils mounted forward on four-foot long splayed struts and a similar fixed foil aft attached to the bottom of a four-foot long extension of a steerable outboard motor strut. The foil incidence control system was basically by an aircraft type joystick to provide both differential foil movement for lateral control and collective movement of the foils for elevation. Unlike aircraft, fully submerged foil craft cannot be "flown" very far, particularly at night, without some altitude sensing input. To provide this intelligence the craft was provided with a mechanical single forward reaching surface feeler, the motion of which modifies the pilot joystick command.

Steering of the outboard motor/rear strut was controlled by foot pedals, which when used together with the joystick would provide a fully coordinated turn, just as in an aircraft. The only other control device was the throttle.

The hull was primarily a monocoque construction of 1/8-inch aircraft grade mahogany faced plywood. Several laminated spruce hoop web frames were installed in strategic places. A five-gallon fuel tank of FRP (fibreglas reinforced plastic) was molded in as an integral part of the hull. The mahogany surface of the hull was varnished making it look like a giant cigar, hence the name. Also, since this project was for a Cloak & Dagger (C & D) type operation, "Cigar" seemed to take the emphasis away from the Navy "Confidential" classification. In flight the craft looked more like a praying mantis.

It should be noted that the name "Cigar" was not officially approved or used but during the building process, Jean Buhler, the Naval Architect on the project, called it the Cigar and everyone at Miami Shipbuilding used that name through the entire life of the project. The name stuck as the craft went through evaluation by the Navy and Marine Corps. While never officially adopted or assigned, that name became the one by which all participants in the program called the vehicle.

An interesting side note relates to the Project Engineer and principal designer of the Cigar, Professor John Dallas Gill. John was a graduate of Carnegie Tech in Aeronautical Engineering and later obtained his Master's Degree from Stevens Institute of Technology. He worked at Bell Aircraft and later at the Kellogg Co. in rocket design and testing after which he became a Professor of Mechanical Engineering at the University of Miami. John became a consultant for Miami Shipbuilding Corp. on the Halobates (See IHS Winter 1992 Newsletter) project during the school year and a full time engineer during the summer months. The schedule for the Cigar fitted John's full time employment time so he became the Project Engineer.



In a first review of the control set up for the Cigar it was noted that the throttle was on the left hand side. When asked "Why this arrangement?" Professor Gill responded by saying that he was going to be the test pilot as well as the Project Engineer. You see, John had a hunting accident at the age of 14 and lost his left arm at the elbow. In the interim he had trained himself well in overcoming this handicap. Try tying a necktie or shoe laces, or cutting a steak with one hand. John accomplished these feats as rapidly as most two arm persons. When John got his private pilot's license the FAA inspector made him wear a socket-like attachment to his left stub to hold the joystick while he adjusted the throttle, mixture control and pitch control with his right hand but John used the socket only when the inspector was present.

In the photo of the "Cigar" in flight, John is at the controls. Colonel Stafford of the U.S. Marine Corp. is the passenger. John had started the engine by reaching his right arm over his left shoulder to pull the engine starter cord, then bumped the throttle ahead with his left stub while grabbing the joystick in his now free right hand. John has been gone for a few years now but he was a delightful, fun loving, talented individual with whom to work, fly, sail or drink.

Another interesting side light is that at the time the craft was being built under wraps the Navy had a contract with Miami Shipbuilding to supply space and assistance to George Meinas in constructing a hydrofoil for demonstration purposes. See IHS Newsletter issue of Winter 1993. George was not to be permitted to see the "Cigar" but he sure tried hard. When the craft was completed it was moved at night to Commodore Munroe's boat house in Coconut Grove out of George's sight and knowledge. See IHS Newsletter item by Jean Buhler in the Summer 1994 issue (page 6) regarding the George Meinas story.

An equally challenging part of the design was the stowage problem. All the hydrofoil appendages had to be folded into the confinement of the 21 inch diameter of the hull. At the same time to ease assembly of the vehicle by swimmers, effort was made to not detach the appendages but to hinge them so that they would only require positioning for flight after being secured. Looking at the photograph, the forward feeler swung back and over to the location where the prone passenger rode. The forward foils and struts also swung aft to store in the pilots location along with the joy-stick.

The outboard engine, rear strut and foil were stowed by having the motor hinge at the transom to fit inside a hull cut-out with the strut and foil extending but within the 21 inch circle limitation.

The photograph was taken during the acceptance trials of the vehicle. All performance requirements were met or exceeded and Phil Eisenberg, who was head of ONR at the time, came for the trials, said the performance was amazing and accepted the craft for delivery. The craft was shipped to Little Creek, Va. for Navy and Marine Corp. evaluation. The outboard used for these efforts was not the one that had been contracted for with submersible capabilities.

During the evaluation, as everyone waited for the new outboard, some interest was shown in the concept. A number of Navy and Marine Corps personnel qualified as pilots. Features of the design were evaluated including the in water assembly of the foil system and the storage of the vehicle in a torpedo tube. The launching of the vehicle and the shore side submergence and retrieval demonstration were held in abeyance pending the arrival of a suitable outboard engine. Such an engine never arrived. The reliability of an outboard, submerged for lengthy periods was not established. With the lack of a suitable engine, interest in the project waned and finally the concept was abandoned. No craft other than the "Cigar" were produced.

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NEWS FROM "DOWN UNDER"

Mr. Garry Fry, a new member of the IHS from Australia, writes:

I have been an avid hydrofoil enthusiast since the age of 4 when the first hydrofoil, a PT20, was introduced to Sydney Harbour in 1965. When I was 13, I made friends with one of the hydrofoil captains while on one of my many weekend harbour crossings.

From that moment I knew that I wanted to become a hydrofoil captain and by the age of 20, I was working as a deckhand with my friend on PT50's and an RHS 140 hydrofoil and a few years after that on RHS 160F's.

As soon as I had completed the prerequisite deck time, I acquired my masters certificate but my goal of becoming a hydrofoil captain was thwarted by a seniority system through which it would first take 10-15 years service on other vessels in the fleet that I have virtually no interest in. As it transpired, the hydrofoils were sold and replaced with high speed Jet-Cats in 1990/91, long before I would have had the seniority required. However, before this occurred I had decided that I wanted to operate my own hydrofoil service and began doing my own feasibility studies, particularly with regard to a tourist oriented PT50 operation.

As an individual with limited resources at my disposal I have found that the biggest obstacle for me in getting such a venture off the ground is in not having the considerable capital required to do so. I have a proposal that I believe will work, but I don't know how long it would take to return a profit or how long any lender would be prepared to carry the venture, particularly when my assets are not sufficient to cover their risk.

Bearing this in mind I contacted Alimar, (the international marketing branch of the Rodriquez group) last year with a Sydney based proposal. They were initially quite interested, writing back and requesting more information to compile a feasibility study. Unfortunately, after receiving from me the information that they requested, they had to advise me that they had to cancel or postpone any new overseas projects for the time being. With my most logical backer not in a position to help I have put this venture temporarily on the shelf and am concentrating on something smaller that I could set up myself that would ultimately assist in financing the PT50 project.

I mention this to you as one of the objects of the IHS is to "stimulate the utilization of hydrofoils for commercial applications." Perhaps the IHS could put me in touch with some pro hydrofoil concern that might be interested in helping to establish such a venture. Tourism in Australia's fastest growing industry and one of its largest, Sydney being the Number 1 tourist destination within the country. Once in Sydney every visitor wants to get out on our magnificent harbour, which is indicative by the vast number of ferries, charter boats and cruising restaurants. Our economy is coming out of recession and growing and we have the build up to and the Olympic Games in the year 2000. I think things are about as good as they are going to get for anyone wanting to re-introduce hydrofoils to the area.

The other venture that I am concentrating on at the moment to get me going is the possibility of running a small hydrofoil on Sydney Harbour as a sight-seeing craft and water taxi. I am aware of a 17 passenger PT4 which is for sale in New Zealand but first have to determine whether it complies with the local authorities survey requirements. For initial survey assessment I need to produce to the authority stability information (stability book) lines plans and construction plans. Unfortunately the current owner does not have this information and two letters to Supramar with this request have so far gone unanswered. I would be most grateful if the Society can help me in any way as I cannot proceed without this information.

I hope that the content of this letter is of interest to you and I look forward to hearing from you in the future.

I am currently employed as a ferry master on Sydney Harbour.

[Editor's Note: Any members that can help Garry are encouraged to do so. He can be contacted at: 6/84 Wellington Street, BONDI NSW 2026, AUSTRALIA; Ph: (02) 306591; Fax: (02) 389 9238]

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KOREANS EYE EXPORT OPPORTUNITIES

(From Marine Log, August 1994)

Korean shipbuilders are most definitely export-minded as one would expect from names such as Hyundai, Daewoo, and Samsung with an extensive range of high-tech fast ferries including foil-assisted catamarans and SES types. Daewoo has recently completed an MTU diesel powered 40.25 m catamaran with a useful layout enabling 260 passengers and eight cars to be carried at 40 knots for a local operator.

Less well known on the general industrial front but developing a high profile in the ferry field is Semo Co. Ltd., a company which has diversified into fast ferry building with the pertinent and valuable credentials of being a major operator with 30 ferries in service around the Korean coast. In 1991 the company embarked on the construction of a shipyard near Busan and, at the same time, undertook a study to determine the type of ferry that would best suit the future demands of both the domestic and overseas markets. After much deliberation the final decision came down in favor of a 31 m glass fiber SES, named *Democracy*.

Tank test results and operational experience with *Democracy* on various of the operating division's routes led to the conclusion that a higher length to beam ratio would provide better sea keeping. Further tank tests were carried out on a model of a 40 m version and changes were proposed to increase the air cushion area to reduce sensitivity in rough seas. The lift fans were moved forward to improve trim and an automatic ride control with trim tabs added. The result is the Semo 40 m SES, the first of which, called *Democracy II*, has been in service on the Mokpo to Cheju Island route since April carrying up to 350 passengers at speeds up to 50 knots. Another has just been completed and a further vessel is under construction.

One of the biggest markets for fast craft promises to be China. The international Marinteknik group, despite owning a Singapore facility, has just invested $12 million in setting up a shipyard in mainland China with the capacity to build up to 16 high-speed ferries per year. Meanwhile, the Qiu Xian yard in Shanghai is already in the fast ferries business building hydrofoils. Designed by Wu Han Design institute, they feature foils machined from stainless steel castings and aluminum hulls and superstructures.

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ROAD CONGESTION SPURS JAPANESE FAST FERRY DEMAND

(From Marine Log, August 1994)

Advanced Multi-hull Designs (AMD), of Sidney, New South Wales, announced that its Japanese licensee, Kawasaki Heavy Industries has secured an order for a 100 m x 20 m AMD type 1500 Mk II aluminum car ferry. Construction of the vessel commenced at the beginning of April this year and delivery is planned in January 1995. The design is interesting in that it allows for two modes of operation. Normally the wave-piercing catamaran will operate on the Yawatahama to Usuki route as a conventional car/passenger ferry, able to carry 460 people and 94 cars at 35 knots, cutting the current fastest journey time from 130 to 90 minutes. In freight mode, however, the single vehicle deck can accommodate 32 trucks of 8 tons or 24 trucks of 12 tons. This freight capacity results in a maximum deadweight of 640 metric tonnes which will be the largest of any existing high speed ferry. Such a capability will provide the operator with off-season and night freight options and perhaps help relieve the overloaded Japanese road system. Propulsion will be by four of Kawasaki's own waterjets driven by four Caterpillar engines, two 3612s and two 3616s, in a "father and son" configuration.

A shift from road freight transport to coastal shipping is Japanese Government Policy and the TechnoSuperLiner (TSL) project is led by an initiative from the country's Ministry of Transport. The objective, which seven major shipbuilders are collaborating to achieve, is to convey 1,000 tonnes of payload at 50 knots (the AMD/Kawasaki vessel in build will only achieve about two-thirds of both parameters).

Japanese thinking currently embraces two distinctly different concepts. Mitsubishi and Mitsui are working together on conventional SES technology and the project has reached the sea trials stage of a fully operational 70 m model prototype. Indeed this vessel will be capable of transporting 44 TEU containers at the required speed of 50 knots. Kawasaki, IHI, Hitachi Zosen, Sumitomo and NKK are all engaged on a much more novel concept involving a single-hulled "SWATH" with foils. Highly futuristic in appearance, this project is currently at trials stage using a 17 m model. [Editor's Note: "Single-hulled SWATH" is a conflict in terms since SWATHs are twin hulled by definition. What is meant is that the hydrofoil version of the TSL, or

TSL-F, has a single submerged hull, a foil system and struts connecting the lower hull to the upper hull structure. See photo below.]

On the conventional fast ferry front, activity in Japan is almost totally inward looking with a healthy home demand and an uncompetitive exchange rate inhibiting export enthusiasm.

Nevertheless the market is extensive and the level of expertise high so that, should the situation change, the Japanese could prove a real threat to current European and Australian market dominance.

A foil assisted "Super Jet" design by Hitachi has recently attracted seven orders and Mitsui has built 23 examples of its "Supramar" design and has a proven amphibious hovercraft capability. The first SSTH (super slender twin hull) ferry developed by IHI has now been delivered and larger car-carrying versions are now being planned.

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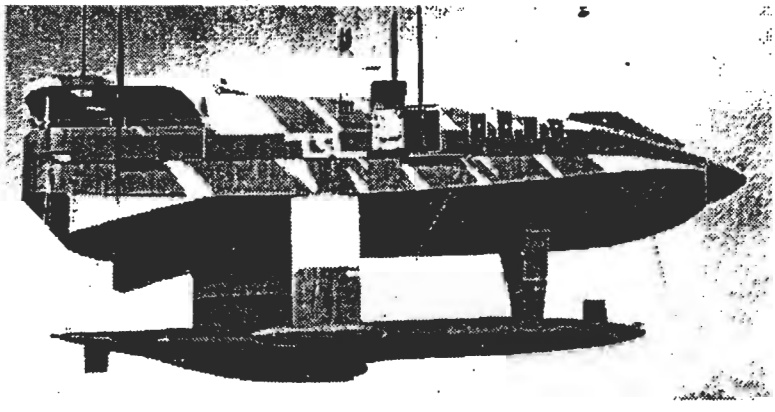
KAWASAKI TSL-F UPDATE

Through the courtesy of Frank Peterson, we were able to obtain the latest information on Kawasaki's design of the prototype vehicle they are building for the Techno-Superliner (TSL-F) project. This test vehicle is 50 feet long, has a beam of 20 feet, is powered by a gas turbine engine driving a waterjet. As one may be able to discern from a Japanese newspaper photograph, Kawasak's version of a hybrid hydrofoil has a single lower hull, five stuts, a small forward foil, a large main foil, and fore and aft rudders. It is assumed that the large bulge on the bottom of the lower hull is a waterjet intake.



This picture, taken from a Japanese newspaper article, shows the TSL-F hanging from a crane at dockside.

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11TH FAST FERRY INTERNATIONAL EXHIBITION

The 11th Fast Ferry International Conference and Exhibition will take place in Hong Kong at the Hong Kong Convention and Exhibition Centre on 21st - 23rd February 1995. The move follows the huge success of the 1993 show in Singapore. With increasing pressure on available space it became inevitable that an alternative venue for 1995 had to be sought. This also allowed consideration of other locations, widening the exhibitors' potential access to the markets of the region.

Officially opened in 1989, the Hong Kong Convention and Exhibition Centre is a spectacular building set right in the heart of Wan Chai overlooking the bustling waters of Hong Kong's Victoria Harbour and is the largest integrated complex of its type in Asia.

Over the past few years Asia in general and Hong Kong and China in particular have become the focus of attention for the fast ferry market. Last year alone nearly a third of all craft delivered went into Hong Kong or China and over a quarter of outstanding orders at the beginning of 1994 were destined for the same markets. More importantly perhaps is the fact that Asia is still a growing market with Singapore, Malaysia, Indonesia, Japan, Korea and other Pacific Rim countries seeing high speed ferries as an increasingly important part of their national and international transport infrastructure.

For further details contact:

David Woodgate, Exhibition Organiser, Fast Ferry International Exhibition, 69 Kings Road, Kingston-upon-Thames, Surrey KT2 5JB, UK. Tel:+44 815491077. Fax: +44 81547 2893

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GE LM2500+: PACKING A MORE POWERFUL PUNCH

(From Maritime Reporter, September 1994)

Market demand for more powerful machines led GE Marine & Industrial Engines (M&IE) to expand its aeroderivative product line, resulting in the recent introduction of the LM2500+ gas turbine.

With a design based on the popular LM2500, the new LM2500+ is designed to provide lower installed and life-cycle costs than its predecessor, while providing up to a 25 percent increase in power output. Combined with minimal changes to the gas turbine package design, the LM2500+ will also provide a reduction in the dollars-per-kilowatt. The LM2500+ will be initially offered at 37,000 shaft horse power (shp) and 27.6 MW, with a simple cycle thermal efficiency of more than 37 percent. It is expected that the engine will achieve standards for reliability in excess of 99.6 percent, and availability above 96.5 percent. Once enough experience has been accumulated on the new gas turbine to ensure it maintains high reliability standards, it will be uprated to its design rating of 39,000 shp, 29 MW and a thermal efficiency of 38 percent. Shipment of the first production engine is scheduled for the first quarter of 1996.

The two-shaft LM2500+ is aimed at the industrial and commercial marine markets for various power generation applications in the 50 and 60-Hz markets, pipeline compression and mechanical drive, and fast ferry commercial marine use. Emissions controls available from introduction of the LM2500+ will include water or steam injection using a standard combustor or the LM2500 Dry Low Emissions (DLE) combustion system.

The new LM2500+ incorporates several enhanced design elements, including:

• Compressor Rotor: The current LM2500 has a 16-stage compressor. The LM2500+ will have a 0-stage added to increase compressor airflow by approximately 20 percent. This wide chord bladed disk forward of stage 1 will be based on aircraft engine technology. M&IE's re-design of stage 1 blades CF6-80C2 to wide chord configuration will eliminate the mid-span dampers. A CF6-80C2/LM6000 rotor airfoil design will also be added to stages 2 and 3. CF6-80C2/LM6000 stages will be incorporated into the compressor to improve compressor efficiency. Additional changes to the compressor include a new inlet guide vane assembly.

• High Pressure Turbine Rotor & Stator: These components will be redesigned to reduce maintenance costs, and will include new materials for improved oxidation life. Stage 1 and 2 contours will be optimized for higher flows.

• Power Turbine: Aerodynamically coupled with and driven by the exhaust gas from the gas generator, the LM2500+ power turbine will be redesigned for the higher power output. The Stage 1 and 6 blades are optimized for aerodynamic efficiency. The power turbine rotor has been strengthened for the higher torque and potential energy of the LM2500+.

The changes make the LM2500+ 13.5 in. (34.3 cm) longer than the 21.4-ft. (6.52-m) LM2500. The weight, in any configuration, is not expected to increase more than 800 lbs. Operating on natural gas at the design point rating, the LM2500+'s expected hot section repair and overhaul intervals are 25,000 and 50,000 hours, respectively. M&IE has produced more than 1,300 LM2500 marine and industrial gas turbines to date.

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HYSWAS MAKING PROGRESS IN GERMANY

(By John R. Meyer)

Recent correspondence, dated August 10, 1994, from a colleague, Dr.-Ing. Volker Bertram at the Institut fur Schiffbau in Hamburg, Germany updates Hydrofoil Small Waterplane Area Ship (HYSWAS) developments in that country. He writes:

"HYSWAS is slowly progressing in Germany. EMIT (Entwicklungszentrum fur Maritime und Industtrielle Technik), HSVA (Hamburgische Schiffbau-Versuchsanstalt GmbH), Mr. Mohr (co-developer of HYSWAS), and I are now negotiating a contract for a feasibility study. The total budget will be some 90,000 DM (60,000 US Dollar). No, there is no zero missing! People think of a remote controlled model, towing tests, market studies, rough structural design and weight estimate, seakeeping calculations, etc. So you see why some negotiations are still necessary. However, I am confident that work will start in October and something will come out for sure. I will keep you informed.

Referring to FAST 93 in Yokohama last December, Volker writes: "Japan was interesting but strenuous. The Japanese supplied some information and I could see (and touch!) the TSL-A in Nagasaki. [The TSL-A is the cushionborne version of the TSL]. But many things are still "classified".

"In September (1994), I will be in Gdansk (former Danzig) to give lectures on hydrofoil and HYSWAS designs. People there are still interested in these topics due to their "great" past in the thirties when Weinblum was Professor there.

"In November, I will give a lecture on HYSWAS design for the German SNAME. Of course, the American HYSWAS "demonstrator project" is very interesting for the audience. It would be great if you could manage to send a better picture than the rather symbolized sketch I have so far.

"We now have a South-African visiting scientist here. His colleague Dr. Hoppe has proposed a hydrofoil catamaran HYSUCAT which has been built a couple of times. Part of his work was published in Ship Technology Research 38/3, 1991. Presumably, Dr. Hoppe also worked on a secret HYSWAS project for the South-African navy. I will try to improve contact with these people."

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WELCOME NEW MEMBERS

Dr. Roger Gallington - Dr. Gallington is employed by Science Applications International Corporation in their Seattle, WA office. He is a long-time proponent of and technical expert on Wingships or WIGs (Wing-In-Ground-effect). He is also involved, more recently, in developing a planing craft-hydrofoil vehicle concept.

Jeffrey Young - Jeffrey worked at the Carderock Division, Naval Surface Warfare Center as a Science and Engineering Apprentice Program student during the Summer of 1994. He contributed to a report describing the application of Hybrid Hydrofoil technology to a small combatant (2200 ton) concept.

CDR Michael Bosworth, USN - In the mid-1970s Mike was involved in experimental work at USNA and MIT on a hybrid SES/hydrofoil concept leading to a 2-person, ten foot craft. Much later, he worked on the Alternative Force Architecture project at DTRC and about 1990 developed the hypothesis of deployable vehicles, one of which was a hybrid hydrofoil, from a "host" ship. As chairman of the ASNE Flagship Section, he was influential in the success of the High Performance Marine Vehicle Conference in 1992. He is currently assigned to OPNAV (N863).

Garry Fry - Mr. Fry lives in Australia and has been a hydrofoil enthusiast for many years. He worked on PT50, RHS 140, RHS 160F hydrofoils in Sydney harbor between 1981 and 1987. He wants to establish and operate commercial hydrofoils in Australia. (See excerpts from his letter to IHS on page 7.)

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MYSTERY ??

An obituary has been received for Richard Carlin, a lawyer and amusement park owner who lived in Baltimore, Maryland and who died on October 11, 1993 at the Union Memorial Hospital at the age of 83. He was a 1935 graduate of the University of Maryland Law School and retired from the Baltimore law firm of Carlin and Duvall in 1986. He was reared in Guilford, Maryland where his family operated an

amusement part which was founded in 1919 as Carlin's Park. The name was changed to Liberty Heights Park and then to Park Circle amusement park which closed in 1955. Now the part that makes this interesting to IHS is that the family operated another amusement park in Buckeye Lake, Ohio. In 1956 Richard and his brother, John J. Carlin Jr., purchased a used hydrofoil from the U.S. Navy and had it dismantled and shipped to the Ohio park.

The brothers named it the "Magic Carpet" because once it attains a maximum speed of 45 knots, it gives the passenger the impression he is riding more on air than the water. At the time Mr. Carlin was quoted as saying "I expect that she'll be unique".

The questions are: does anyone know what Navy hydrofoil this is and does anyone have anymore information on the operation of this hydrofoil as an amusement park ride? If so please let us hear from you and we'll inform the membership of the identity of this hydrofoil.

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THE AUSTRALIAN HIGH SPEED FERRY INDUSTRY WITH A MESSAGE FOR THE UNITED STATES

(Dr. Frank Peterson Executive Summary report to ONR)

In spite of the fact that there is essentially no domestic market in Australia, the Australian high speed ferry industry has become the dominant supplier worldwide. This has occurred in less than 10 years. The Australian government and industry are cooperatively working together to keep Australia the principal exporter of high speed ferries as the markets continue to expand. For the purposes of this report, a high speed ferry is considered to be greater than 30 meters long and capable of speeds greater than 30 knots.

The Australians do their own designs without the benefit of a domestic model testing facility. They import much of the aluminum, all of the propulsion components, and the night vision system. With designs that focus on low initial and operating costs and with high quality hull manufacturer and system integration, the Australians export to all parts of the world. While Japan, Korea, and Europe are offering a broad variety of designs to customers, Australia has focused primarily on the catamaran. They supply most of the high speed passenger ferries to China and Hong Kong, the largest market in the world. They have sold more high speed car ferries than any other nation, in a market they basically created in 1989, with sales principally to northern Europe and South America. Currently, the Australian industry is discussing cargo designs with shipping companies for the high speed cargo ferry market. Japan is now completing their 6 year national program to develop a 50 knot high speed cargo ferry with two hybrid concepts that will be expensive to manufacture and operate. Australia is offering the same speed and cargo capacity but has basically scaled up versions of catamaran designs now operating. These would have much lower initial and operating costs than the current Japanese concepts if the preliminary estimates can be realized.

Speed is a very important factor in both the initial cost and the operating cost of a vessel and in many cases has a big impact on the vessel size. The need to increase number of trips per day, expand customer base, decrease passenger exposure to sea conditions, eliminate need for berthing and/or galleys, or match a competitor's land, sea, or air transport time, all lead to the speed requirement. A "modal shift" in transportation is also beginning to take place in China and Japan. In these two countries land transportation is becoming increasingly inadequate and expensive and high speed sea transport appears to be a cost effective alternative. These considerations also apply to car ferries where vessels with service speeds up to 55 knots are now under construction in Australia. High speed cargo ferries are now being considered for the same reason that air transport has increased market share in recent years: high value cargo has a depreciation rate or a money interest rate that makes it time sensitive. Globalization of industry and expanded intra-industry trade have also created more time sensitive cargo. This cargo includes fresh food, luxury goods, expensive apparel, sophisticated manufactured items, and repair parts.

With the exception of the gas turbine propulsion systems, the U.S. is not a participant in this high speed ferry market. Ironically, even though the U.S. uniquely has the R&D base, the technology, and the manufacturing base, it does not appear to be considered a future competitor by Australian and East Asian industry. If the U.S. is to participate in this market to develop a high speed commercially-viable, military useful ship in support of the current Strategic Sealift R&D Requirement, then a cooperative effort between government and industry should be initiated now. If a more efficient means of material transfer from off-shore ships to the beach is to be developed, then the technology of the fast ferry industry should be considered. If future combatants will need improved seakeeping and/or higher speed, then the technology used in high speed ferries is applicable. The development of the Australian industry, with its limited resources, clearly demonstrates what could be achieved in the U.S.

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TRASMEDITERRANEA

(From Fast Ferry International, July-August 1994)

State owned Compania Trasmediterranea has been involved with fast ferries since 1980 when it introduced a leased Boeing Jetfoil 929-100 in the Canary islands. This was replaced the following year by two Jetfoil 929-115s, which were subsequently replaced, in 1990-1991 by a pair of Kawasaki Jetfoil 929-117s.

In 1988 services in the Balearics appeared following the acquisition of Rodriquez RHS 160F and Kolkhida hydrofoils. The next year the network was expanded to include two routes from Algeciras to Ceuta and the Moroccan city of Tanger.

For the past couple of years, however, Trasmediterranea has operated only the longer of the two routes, Algeciras-Tanger, using one of the four RHS 160Fs currently in its

fleet. But the company is, to some extent, cooperating with Isnasa as the services of both companies are now listed in Trasmediterranea's timetable.

This summer RHS 160F *Pez Volador* has been allocated to the route. Originally delivered to Aliscafi SNAV, this was purchased in 1988 by Naviera Mallorquina, another company in the Trasmediterranea group, and leased on to Trasmediterranea.

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LETTER TO THE EDITOR

How thoughtful of you to send the IHS Newsletter with the lovely remembrance of Harry. Yes indeed, he was completely, unequivocally devoted to the hydrofoil principles. So many occasions on our travels he would extol their virtues and value, often in response to an inquiry about his tie pin - which he wore to his grave with his R.P.I. ring. He was a good companion - witty, knowledgeable, supportive, generous - and was my Polaris. I miss his wisdom.

Thank your colleagues for their sympathy, The children and I do appreciate it. They miss Harry as much as I do in many ways. We were fortunate to have fifty years together. May you all be so blessed.

Fondly, Betty Wallace - August 18, 1994.

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LETTERS TO THE EDITOR

In the Spring 1994 NEWSLETTER, we acknowledged a letter from Mr. W. R. Frank, an 81 year young hydrofoil sailing enthusiast, who lives in Barnsley, England. In this same letter he inquired about Waldemar Craig (Grunberg). Your editor replied as follows:

Your interesting letter of December 10, 1993 finally found its way to me as the editor of the International Hydrofoil Society's Newsletter. Comments from your letter will be included in our Spring 1994 issue. We thank you for your input and hope you will stay in touch with the Society. I wanted to respond to your query regarding Waldemar Craig (Grunberg). In his later years he became a good friend of mine, visiting in our home on several occasions when we were living in the Washington, D.C. area.

Waldemar is now dead. He passed away in the late 1980s. I have been unable to come up with the exact date. I too attended the Brighton Conference, helping arrange Mr. Craig's attendance with Juanita Khalergi the promoter of the conference.

Waldemar never received the recognition he deserved for his efforts with hydrofoils. As you may well know he was a Russian Officer who escaped to France and was then known as Wsevolode Grunberg. He was certainly one of the first ones to experiment with controlled, submerged foils. Some of his early models were tested at the Saint-Cyr model basin in France and showed promise. In the late 1930s he came to the United States at the invitation of the National Advisory Committee for Aeronautics (NACA) to demonstrate his hydrofoil design principal. NACA was interested in the application of Grudberg's ideas to seaplanes. Several models were built and tested at Langley, Virginia. As one of the ironies of wartime security, classification of the project prevented him as a foreign citizen from seeing the results of the tests. In fact due to immigration laws Grunberg had to leave the U.S. He went to Canada, changed his name to Waldemar Craig, and returned to the U.S., eventually becoming a citizen. It wasn't until years after WW II when all interest in hydrofoil landing gear for seaplanes had ceased, that Mr. Craig found out how really successful the NACA tests had been.

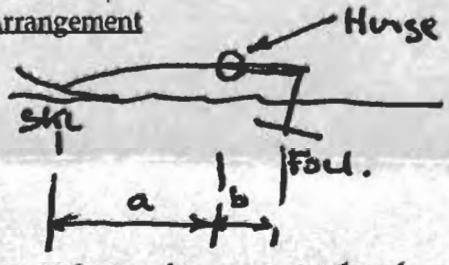
In his last years the International Hydrofoil Society tried to give him at least some of the recognition he deserved as a true hydrofoil pioneer.

In response, Mr. Frank replied as follows: "After the Brighton, IHS conference (mentioned in your editor's above reply) a friend and I took Waldo sailing and displayed to him by towing, one of my sailing hydrofoil ideas. It foiled very well. Of course, Waldo had to be critical; but I got the impression he approved." [Note: Waldo is used for Waldemar.]

"Once when I was in Manhattan, I crossed the river into New Jersey and visited Waldo. He had a flat in a very prominent block. From our conversation, I got the impression that he had worked on helicopter developments as well as large airplanes. One of his ideas was applied to large aircraft that were being flown across the Atlantic. As a help, if a plane had to come down onto the sea, he put a ski out ahead. He said that it worked very well. Probably he meant applied to a seaplane or a flying boat. But he did mention bombers."

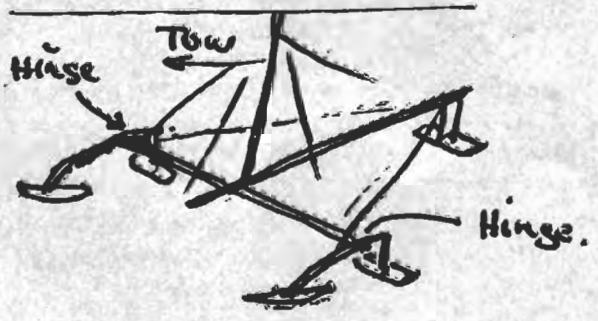
"Waldo certainly received recognition from we amateurs- in the Amateur Yacht Reserve Society, but as Grunberg. Nobody knew, until I told them that he had changed his name."

Grunberg Arrangement



a/b must be equal to or greater then 6.

W. R. Frank arrangement model tested, and shown to Waldo.



THE NEWSLETTER

INTERNATIONAL HYDROFOIL SOCIETY

Post Office Box 51, Cabin John, Maryland 20818, USA

Editor: Robert J. Johnston | WINTER 1994 | Co-Editor: John R. Meyer

IN THIS ISSUE.....

PROGRAM ANNOUNCEMENT

JOINT MEETING OF IHS, SNAME SD-5 PANEL, AND U.S. HOVERCRAFT SOCIETY
FEBRUARY 2, 1995
FORT MYER OFFICERS CLUB, ARLINGTON, VIRGINIA
ABRAMS ROOM

6:00 PM Cash Bar - 7:00 PM Dinner - 8:00 PM Program; $20.00 Per Person
Menu- Lobster Bisque, Herb Roasted Chicken, Vegetables, Dessert, Coffee
Make reservations no later than January 30 if you plan to attend. Call one of the following:
John R. Meyer 301-227-1796; Kathy Pellicci, 301-227-1177

[*Note: Please honor reservations. Sponsoring organizations are responsible for no shows.*]

PROGRAM

"HIGH PERFORMANCE VEHICLES IN THE PACIFIC RIM"

DR. FRANK PETERSON

Dr. Frank Peterson recently completed a six month assignment at the Office of Naval Research in Tokyo on high performance ships and craft in Asia. He travelled throughout East Asia and Australia discussing this subject at R&D organizations, design offices, shipyards, shipping companies, and government offices. His task for the U.S. Navy was to assess the current status and determine the direction of and the process used to select future R&D. Dr. Peterson's talk will focus on the evolution of high performance ships and craft bought and built in East Asia and Australia with a projection of the future.

25TH ANNIVERSARY CELEBRATION ANNOUNCEMENT

SEE PAGE 3 FOR DETAILS

THE PRESIDENT'S COLUMN

Concurrent with the printing of the Autumn 1994 Newsletter, the IHS Board of Directors decided to proceed with plans for the 25th Anniversary Celebration of the Society's founding. Much warranted praise and thanks go to Program Co-Chairmen Mark Bebar and George Jenkins. They have made great progress in planning this important event (see page 3). Another weighty responsibility for the same event has been taken on by Barney Black, the Papers Chairman, who has sent out letters to all members who had indicated a desire to prepare a paper for the occasion. Barney will also be handling the publication of the Conference "Proceedings". Subsequent to receipt of all paper abstracts, a preliminary program and registration information will be sent to all members.

As we review the literature, your editors are impressed with the progress being made in the hydrofoil arena worldwide. The articles in this issue are particularly noteworthy as we see examples of such progress in Greece, Italy, the Ukraine, Finland, and Japan. Congratulations are in order for all those designers, builders, and operators worldwide who have the vision to forge ahead on these developments. The transportation authorities in the U.S. could certainly follow such prime examples of "forward thinking". Let us hope that the Advanced Research Projects Agency (ARPA) workshop on this subject (see page 6) planned for the late Spring 1995 will be a step in this direction. It is anticipated that IHS members will play a role in this workshop as part of fulfilling the Society's mission and meeting its objectives.

The Society is indeed fortunate to have Mark Rice as it's Membership Chairman on the Board of Directors. He has been very effective in writing to prospective members who have responded with applications for membership. As a result, as you can see in the next column and in the last several issues of the Newsletter, we have welcomed about 13 new members during 1994. We anticipate that 1995 will even be better due to Mark's effort. We suggest all members encourage their colleagues to join the IHS.

Again, I make a plea to all members to send the IHS Newsletter editors news about yourself, your colleagues, and what is going on in the hydrofoil world. We want to and need to hear from you.

Related to this is a special plea. In the process of gathering information for Bob Johnston's paper on "IHS History", it became evident that there is little to no documentation in the IHS files about IHS events between 1970 and 1976. Mr. Derek Deere has offered his help (see Letters to the Editor, page 12). Any members having such information should send a copy of same to Robert J. Johnston, 199 Surf Scooter Drive, Daytona Beach, FL 32019

At year end, as this last Newsletter of 1994 is being published, I want to take this opportunity, on behalf of the entire Board of Directors, to extend to all IHS members best wishes for a successful and fruitful 1995.

John R. Meyer, President

WELCOME NEW MEMBERS

Dr. Hikaru Yagi

Dr. Yagi is employed by Mitsui Engineering & Shipbuilding Co., in Japan. He is engaged in R&D of advanced marine vehicles including hydrofoil catamarans, Small Waterplane Area Twin Hull (SWATH) ships and planing boats.

Daniel Jordan

Danny is an electrical engineer, who has worked for seven years on the design of microprocessor based control systems for advanced marine vehicles. Currently employed by Maritime Applied Physics Corporation, Danny is participating in the development of a motion control system for a 27ft HYSWAS Demonstrator.

Michael Perschbacher

Mike is a recent graduate of Virginia Tech with dual degrees in Ocean and Aerospace Engineering. He is now working at Maritime Applied Physics Corporation, helping to construct the HYSWAS 27 ft. Demonstrator vehicle.

Paul Hunt

Paul is Vice President for Logistics and International Marketing at Peterson Builders, Sturgeon Bay, Wisconsin. Previously he had been a consultant in propulsion and systems analysis for various shipyards. His prior employment also includes Lockheed Shipbuilding in Seattle.

John van der Pas

John is currently President of LIPS USA in Chesapeake, VA. He had previously been Marine Engineer and Chief Engineer with Smit Lloyd, England, and prior to that with LIPS in the Netherlands and Canada.

Thomas J. Ingram

Thomas is Head of Engineering & Survey for the American Bureau of Shipping (ABS) Gov't Services where he has served for 27 years. His formal training has been in the field of structures and particularly ocean structures. He has a general interest in hydrofoils and application of ABS high speed craft requirements to new designs.

Glenn M. Ashe

Glen has been is with ABS, Americas (American Bureau of Shipping)in Houston, Texas for almost 5 years. He had served as Director of Engineering and currently as Director of Business Development. Previosly he was with the Military Sealift Command in Washington, DC.

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1995 DUES ANNOUNCEMENT

All members are advised that Annual Dues are to be paid in January of each year. Invoices will be sent to members not responding to this announcement. If you pay now, considerable postage and effort on the part of the Secretary-Treasurer will be saved. Your cooperation is solicited.

Please send a $20.00 check made out to IHS to:

CAPT. John W. King, USN (Ret.)
4313 Granada Street
Alexandria, VA 22309 USA

PLANNING FOR IHS 25TH ANNIVERSARY CELEBRATION AND CONFERENCE

(By George Jenkins)

Based on membership response to the questionnaire circulated last August, the Board of Directors has proceeded with planning for the IHS 25th Anniversary Celebration and Conference. Following is the present status:

The conference will be held in Annapolis, Maryland on 14, 15 and 16 June 1995. The Annapolis venue was chosen in response to the many requests that the meeting be close to the Washington, D.C. area, and with a view toward the many historic, cultural and scenic aspects of the city.

A block of rooms has been reserved at Loews Annapolis Hotel, which is also where the conference will take place. Loews is very close to the main business, shopping, and historic areas of Annapolis. The rooms will be held until 14 May 1995. Members desiring to stay at the hotel must make their own reservations prior to that date. The special rate given to IHS is $115 per night (single or double occupancy). The Hotel's telephone number is: 410-263-7777; be sure to identify yourself as an IHS member! NOTE: June is a very busy time in the Annapolis area; hotel space is at a premium. The Board urges members to make reservations NOW, even if there is some uncertainty regarding attendance.

The basic conference schedule is still being refined, but in general terms we foresee two full days of presentations (about 16 papers planned), with Friday, 16 June available for a morning Panel Session, and later, tours of the area, sports, etc.

There will be a dinner at the hotel on the evening of Wednesday, 14 June. The cost of this dinner will be included in the registration fee, which the Board hopes to keep at or below $100. This will also include the cost of printing the proceedings of the conference (i.e.., the papers). The proceedings will be included in members' check-in packages, if all goes as planned.

At present no other dinners, luncheons, or receptions are planned. Annapolis abounds in good restaurants and adequate free time will be scheduled to allow members to take advantage of this situation.

NOVEMBER TROIKA MEETING A GREAT SUCCESS

John Adams, Vice President of Maritime Dynamics, Inc. (MDI), gave a very interesting talk to a joint meeting of the IHS, U.S. Hovercraft Society and the SNAME SD-5 Panel members on November 10, 1994. Well illustrated with bits of humorous artwork on his slides, he described the Company's development of ride control systems to assist designers, shipyards and owners in providing the best seakeeping available for their vessels.

In cooperation with Condor, Ltd., MDI began an investigation of using T-foils forward on catamarans as control surfaces in place of fins that MDI previously used on other installations including CONDOR 9 and SEAJET 1. This investigation lead to MDI's first ride control system installation using T-foils which was on the CONDOR 10. These T-foils combine both flap and incidence control and along with two large stern flaps are commanded by MDI's electronic controller. The T-foils have improved the motions of the vessel so it can operate in seas up to 3.5 to 4 meters without excessive passenger motion sickness or fatigue.

Since this first installation, MDI has continued its T-foil design program. Most recently, MDI installed T-foils on FEI LONG, a 49 meter catamaran built by WaveMaster International. At 41 knots, FEI LONG operates across the mouth of the Bohai Sea between Dalian and Yantai. The ride control system control surfaces consist of two hull-mounted T-foils forward and two stern flaps aft. These foils differ from the ones installed on CONDOR 10 in that they are smaller and bolt onto the hull. This configuration has reduced the vessel's pitch and roll motion by over 60%.

During 1993, MDI began internal discussions of what new markets they could enter with their ride control-system technology. The direction chosen was the monohull ferry. As the monohull is still in high demand in the ferry industry, improving the ride of these vessels would provide a great service. In addition to ride control, MDI offers a system that also provides steering control. The first installation of this type was on the Wavemaster International SUPER FLYTE. The control surfaces consist of four large transom flaps and twin rudders. The system provides trim and list stabilization, pitch, roll and yaw damping and an autopilot. Rudders are used to augment roll damping in heavy seas and provide yaw damping for directional control in large quartering and following seas. MDI's most recent installation of the integrated steering and ride control system is on two 100-foot passenger ferries, CATALINA EXPRESS and ISLANDER EXPRESS. The vessels were built by Westport Shipyard for Catalina Express. They entered service on 6 June and run between San Pedro and Avalon. These installations have increased MDI's number of ride control system installations to 45 worldwide.

IHS COASTERS AVAILABLE

Coasters measuring 3-1/2 inch in diameter, having the IHS Logo make a great addition to IHS member's coffee tables. They are available for sale in sets of four at a price of $12.00 per set plus $2.95 for mailing. After you receive your coasters we would like to have your opinion on having a similar medallion placed on coffee mugs, and made available for purchase.

SPECIAL NOTICE:

The Society is attempting to establish an INTERNET network of IHS members. If you have an INTERNET address, please send it to Jim King at the following INTERNET address: "jking@oasys.dt.navy.mil". The addresses will be compiled and distributed both electronically and in future Newsletters.

RODRIQUEZ DELIVERS FIRST FOILMASTER HYDROFOIL

(From Fast Ferry International, September 1994)

The first Foilmaster hydrofoil launched by Rodriquez Cantieri Navali,*Tiziano*, entered service with Sicilia Regionale Marittima in July 1994 on the company's route network between Milazzo, on the north coast of Sicily, and the Eolian islands.

The Foil-master has been developed from the RHS 160F and has approximately the same overall dimensions as the earlier design but features revised external styling, greater capacity and more powerful diesel engines. Rodriquez reports that increased speed in any sea state and passenger comfort were the prime goals during the design of the Foilmaster.

Detail changes include resilient mounting of engines and gearboxes. the installation of exhaust silencers, and the use of carbon fibre components in the foil system and fibreglass reinforced plastic (frp) for parts of the superstructure.

Hull

The aluminium hull of 5086 or 5083 plate and 6082 angle sections is generally riveted, with some welded areas, and has longitudinal framing at 300mm intervals.

Four watertight bulkheads divide the hull into a fore peak, forward passenger saloon with sub-divided double bottom space, machinery room, aft passenger saloon with sub-divided bottom space and aft peak.

Two large superstructure components, the wheelhouse and aft companionway have been fabricated in frp. Elsewhere the material has been used for ducting and fendering around the bow.

Foils

The Foilmaster has the familiar Rodriquez tandem foil configuration. Like the company's earlier vessels, the foils are of hollow construction and produced in high tensile steel. The foil struts are fitted with rudders one forward and two aft, the actuation of the aft pair initiating an electrical impulse to the forward one.

Both sets of foils are fitted with flaps that are part of the long established Rodriquez seakeeping augmentation system that also comprises an analog computer, vertical gyro, vertical accelerometer, position transducers, servovalves and hydraulic cylinders.

Main Engines

A pair of MTU 16V 396 TE74 diesels, rated at 1,550 kW at 2,000 rpm, each drives a three bladed nickel aluminium bronze fixed pitch propeller via a ZF BW 750S reversing gearbox. Full load service speed of 36 knots is normally achieved with the engines operating at 1,940 rpm.

Passenger Saloons

The standard capacity of the Foilmaster is 220 passengers, ten more than the maximum capacity of the RHS 160F, with two passenger saloons on both decks.

Normally, the lower deck would have 113 seats, 50 forward and 63 aft with a toilet in each saloon. On the upper deck, there would be 44 seats plus a toilet forward and 63 seats aft. Amidships there would be a foyer by the port and starboard access doors, five luggage stowage areas and a bar. Rodriquez has offered an alternate layout providing a total of 242 passengers for its Foilmaster.

Rodriquez Foilmaster *Tiziano*

Length overall	31.40m
Length waterline	26.40m
Moulded breadth	6.78m
Hull depth	3.89m
Foil spacing	20.90m
Maximum foil width	13.27m
Draught	
- Foilborne	1.45m
- Hullborne	3.89m
Displacement	
- Full load	112 tonnes
Operating weights (220 passenger version)	
- Fuel	2,500 kg
- Lube oil	250 kg
- Fresh water	600 kg
- Passengers	14,300 kg
- Crew	525 kg
- Luggage	1,100 kg
Passengers	
- Lower deck	132
- Upper deck	115
- Total	242
Crew	7
Service speed - Full load	35 knots
Range	120 n miles
Main engines	2 x MTU 16V 396 TE74 1,550 kW at 2,000 rpm
Auxiliary power	2 x 57.5 kVA 220v AC 3 ph 50Hz

ONR NEWS FROM TOKYO

The following are excerpts from a report by Yong S. Park of the Office of Naval Research (ONR) Asia office in Tokyo.

INTRODUCTION

With the theme, "The Sea Incubates Life and Culture", TECHNO-OCEAN '94, the 5th International Exhibition & Conference on the Exploration, Development, and Management of Oceans and Coastal Zones, was held in the Kobe International Exhibition Hall in Port Island of Kobe, Japan, on 26-29 October 1994. The Exhibition was participated in by 11 foreign countries and about 50 Japanese companies and professional associations, and about 160 technical papers were presented at the symposium. While the size of the exhibition was small, perhaps, reflecting the effect of changes in the industrial structure necessitated by long depression after the collapse of the Japanese bubble economy, the symposium attracted the largest number of papers in recent years.

This year's event had a special significance because it was held at the time when the Kansai region is bustling with a series of new remarkable technological developments, including the opening of the new Kansai International Airport, an international airport hub, the near completion of Akashi Strait Bridge, the longest suspension bridge in the world, and vitalization of Kobe Harbor land with a plan to build another man-made island for a new Kobe International Airport.

TECHNICAL SESSIONS

The technical sessions of the symposium were structured to included: Ocean Research/Measurements; Materials for Marine Use/Instrument Development; Ocean Resources Development; Deep-Sea Robotics; Floating System; Organic Purification/Mitigation of Marine Environment; Marine Environment Creation; Utilization of Ocean Coastal Space; Creation of Cozy Coastal Space; Ocean Network (including: Ship Operation and Safety, Ship Structures and Performance, Advanced Marine Vehicles); Marine Culture; and Osaka Bay Area Development and Environment Creation.

The technical session for advanced marine vehicles included:

1. "Development of Foil-Assisted Catamaran, SuperJet 30", by Toshihiko Arii and Kazuya Hatta (Hitachi Zosen Corp).
2. "Hydrodynamic Design Philosophies of the Hydrofoil Catamaran", by Ken Shimizu, Kazuo Masuyama, Hikaru Yagi (Mitsui Engineering & Shipbuilding Co.)
3. "Development of Excellent Ride-Quality High Speed Catamaran, V-CAT", by Hiroshi Sugioka, Osamu Yamamoto (NKK Corp.)
4. "A Submerged Hull and Foil Hybrid Type Techno-Super Liner (TSL-F)", by Naoki Yamanaka (Kawasaki Heavy Industries, Ltd.), Kazoo Hayashi (NKK Corp.), Hiroshi Nogami (IHI), Toshihiko Nagatsuka (Sumitomo Heavy Industries, Ltd.), Toshihiko Arii (Hitachi Zosen Corp).
5. "The Second Stage of TSL-A R&D Program", by Hiroomi Ozawa (Mitsui Engineering & Shipbuilding Co., Ltd.), Sumitada Morishita (Mitsubishi Heavy Industries, Ltd.)
6. "Diesel Driven Fully Submerged Hydrofoil Catamaran", by Chikafusa Hamada, Masao Miyoshi, Kazuyuki Kihara, Hidetoshi Sueoka, Takashi Kawakami, Tsuneo Harada, and Naoji Toki (Mitsubishi Heavy Industries, Ltd).

OBSERVATIONS

A comprehensive coverage of multi-subjects was not possible at this conference, which is the case for any international conferences of this magnitude. Among major subjects discussed, papers on the Osaka Bay Area Marine Corridor Plan received most coverage and interest. The Marine Corridor is an ambitious gigantic sea-city system concept that consists of the undersea beltway corridor line and a corridor link connecting the cities/towns and airports in the Osaka Bay area. On the global level, it is designed to serve as a model for creation and improvement of clean environment in closed bay areas that have been faced with pollution problems in many areas of the world, and to present a concept for a new city image for the people and the earth in the 21st Century. On the regional level, it will form a second hub of economic sphere in addition to the Tokyo capital region. The current plan is to develop this into a national project by 1996, start construction in 2001, and eventually to complete the whole corridor by 2015. The organizing committee of this conference gave an impression to use this symposium as a forum to muster support from the international experts on this kind of project by convincing the key government and local policy makers that the project is feasible and highly desirable. However, none of the speakers presented an estimated total cost for the project and they refused to provide an answer to the repeated question. A separate report with more detail on the subject may be provided if there is any interest from anyone.

The Japanese shipbuilders, faced with growing strong international competition, especially from Korea, as well as emerging shipbuilding countries such as China which can build ships of conventional types, such as tankers, bulk carriers, cargo ships and ocean liners, much cheaper due to lower labor cost and strong support of the transportation concept of the "Modal Shift".

Currently, two versions of the Techno-Superliner (TSL) are going through rigorous sea trials, results of which were presented to the Conference. Three papers on TSL development and sea trials indicated that preliminary assessments of the trials were an unqualified success. I was interested in riding on one of experimental ships to observe the tests, but my request was turned down, as the actual trials remain confidential especially to foreigners. My request for obtaining video tapes of the trials was also turned down. However, as a participant in the Conference, I was allowed to join in the study tour group, observing a fly-by of the TSL-F, a hydrofoil hybrid type ship, from a nearby ship. The ship was doing about 40 knots in a foilborne run and showed an excellent turning capability. (See related article on page 6.) The important issue of the ship's seakeeping capability in high waves was not demonstrated on this tour. Again the major question was: what is the estimate of total cost, but no answers were provided even by the responsible official of the project. According to one source of information, however, it may cost as much as $100-150M to build an

initial ship. [Editor's Note: The mission of the TSL is to carry 1,000 tons of cargo a distance of 500 n miles at 50 knots in Sea State 6.] Apparently, Japan is not concerned about selling the TSL ships to other countries, and thus the cost is not a driving factor. There is an indication that Korea is also seriously thinking about developing its own TSL! These kinds of cargo ships may find their utility in U.S., for instance, providing cargo transportation between coastal cities on both coasts in competition with highway truck transportation.

AMV ACTIVITIES IN JAPAN

(From SNAME SD-5 Newsletter; 1 October 1994)

Mr. Hikaru Yagi, of Japan has provided the following review of Advanced Marine Vehicle (AMV) activities in Japan for the period 10 June to 7 September 1994.

General - During this period AMV activity has been somewhat slack. September 4, 1994 was the opening date for the New Kansai Airport which will operate 24 hours a day. The Techno Superliner (TSL) Program is in its final stage. This is a 6-year program. The A-type (SES) (70 meters) is undergoing trials. TSL-F (Hybrid Hydrofoil) details have not been released.

Sea Routes to Kansai Airport - There are three access routes by sea - where AMVs will be operating:

Kobe Route - 33 round trips are scheduled (every 30 minutes) from 0500 to 2300 hours. The trip takes about 30 minutes. Three Kawasaki Jetfoils will be used on this route. These craft, carrying 230 passengers at 43 knots, are powered by Allison 501KF gas turbines with Kawasaki waterjets.

Awaji Route - 11 round trips are scheduled between Awaji Island, the airport and Osaka. The trip takes approximately 40 minutes per leg. The AMV on this run will be the Hitachi SuperJet 30 FoilCat. This 31. 5 meter, 160 passenger craft, is powered by Niigata 16V16FX diesels at 34 knots.

Tokushima Route - Six round trips are scheduled between Tokushima, the airport and Osaka. These legs take 40 minutes and 80 minutes respectively. The AMV is the 300 passenger Mitsui MightyCat 40 (43.2 meters), a semi-planing catamaran. Speed of this craft is 35.8 knots.

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HPMV INFORMATION PRESENTATIONS - ARPA MARITECH WORKSHOP

Carderock Division, Naval Surface Warfare Center, has held discussions with Advanced Research Projects Agency (ARPA) MARITECH program personnel relative to a High Performance Marine Vehicle (HPMV) Technology Workshop which the MARITECH program would sponsor. ARPA plans to conduct the workshop in the Spring, 1995 timeframe. ARPA asked CDNSWC to coordinate with the Coast Guard and the American Waterways Shipbuilding Conference before submitting a formal proposal to develop this workshop. The gist of the Carderock proposal is that they will oversee the preparation of workshop materials and conduct follow-up after the conclusion of the Workshop. Outline for MARITECH technology workshop is as follows:

Introduction - MARITECH overview, Workshop purpose and objectives
Status of High Speed Waterborne Transportation describing the utilization of high speed waterborne systems in North America, Europe and Asia
HPMV Concepts and technology status. Unique features that differentiate various HPMVs State-of-the-art for each type
Economics- UMTA/UHI Studies, Europe and Asia. Sample routes, Cost models
Composite Structures
Technical and Regulatory Concerns and Issues
Design Tools - Modeling
Industrial Base
Sources of Information
Military Utilization - Dual Use
Analysis of Issues - Direction - Action Items
ARPA Procedures - BAA, etc.

More information and details will be forthcoming in the next Newsletter.

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TSL-F UPDATE

Thanks to the courtesy of Dr. Volker Bertram of the Institut fur Schiffbau, University of Hamburg, Germany, IHS has received a high quality color slide of the Techno-Superliner, *HAYATE*, in the foilborne mode.

A similar picture in the September issue of Fast Ferry International has the following caption: Trials of the 17m TSL-F prototype hybrid hydrofoil *HAYATE*, built by Kawasaki Heavy Industries' Kobe yard for the Technological Research Association of Techno-Superliner, started in Osaka Bay in July 1994. During the same month, sea trials of the other TSL prototype completed earlier in 1994, the 70-meter TSL-A hybrid SES *HISHO*, got underway off the Goto Islands.

TRAFFIC BOOMS ON THE HELSINKI-TALLINN ROUTE

(From Fast Ferry International, October 1994)

There is a route in northern Europe that barely existed five years ago that will carry over 2.5 million passengers this year, around 10% of them on fast ferries, and more than 100,000 vehicles. Yet within the next five years, passenger traffic is expected to double. The route is Helsinki-Tallinn.

The catalyst was the re-establishment of Estonia as an independent country in 1992. Unlike most of those in the Baltic, the route linking the capitals of Finland and Estonia is relatively short, 45 nautical miles, and this has resulted both in the diversion of traffic from the Helsinki-Stockholm ferry services and the creation of a new day return market.

At present, approximately 75% of passengers originate in Helsinki and 25% in Tallinn. Businessmen and foreign tourists travel from Helsinki but the attraction for many Finns is the drastically lower cost of domestically produced goods and food in Estonia. For the majority of Estonians, the fare is very expensive. However, many now work in Finland and use the ferries to commute.

The peak period for traffic is June-August and this summer four companies were operating a total of six fast ferries and one company was operating four ships. During July and the first half of August, there were 26 scheduled crossings a day by hydrofoils, surface effect ships, a wavepiercing catamaran or a foil assisted catamaran. There were eight by ships.

Since then, the number of ferry crossings has increased with the arrival of another operator offering one return service a day. In addition to this, mini-cruises are operated by two other operators and there are six aircraft flights a day in each direction.

Three of the four fast ferry operators were advertising identical crossing times of 90 minutes, which included about ten minutes of low speed running through Helsinki harbour and a delay while a pilot was embarked or disembarked. The scheduled journey time by ship is 3 hours 30 minutes or 4 hours.

Tax free and duty free sales on board the fast ferries are an important source of revenue but are limited, compared with the ships, due to weight and space considerations, particularly on the hydrofoils, and the fact that only Finns who have been overseas for more than 24 hours can legally make purchases. Hence the attraction of 25 hour package trips and cruises.

Flying time is 35 minutes but the fast ferries are able to match the city centre to city centre times of air travel and the cost of flying, FIM 400-500, which is more than three times the economy fare and double the business fare charged by the fast ferry operators.

The standard single fare on the ferries is FIM 120 and the last ferry operators either match this or charge a premium of 10-15%. Tallink Express and City Jet also sell multiple journey tickets at discounts of 20% or more.

Until recently, the fast ferries were operating into different parts of Tallinn. The most remote location was the City Jet terminal in Pirita, a harbour outside Tallinn created for the yachting and rowing events in the Olympic Games of 1980. The company ran a connecting bus service but this left the city centre 45 minutes before each departure.

One company, Tallink Express, continues to use its own harbour in Tallinn but the others relocated to nearby terminal facilities within the main port at the end of August. Both are located close to the city's Old Town, its main tourist attraction.

The market share achieved by the fast ferries during the summer is considerably higher than the yearly average of about 10% because the operating season is restricted to seven or eight months from the beginning of April until around the middle of November.

During July 1994, the only complete month in which six vessels were operating simultaneously, the fast ferries carried over 90,000 passengers and achieved a market share in excess of 35%.

In fact, this year's operating season has been shorter than usual because the weather last winter was particularly severe and the route was not clear of ice until the end of April. Even the ships experienced difficulties at the beginning of the year, when ice as thick as six metres was being encountered and crossing times increased to as long as six hours. Generally, though it is not ice that dictates the end of the fast ferry operating season but an extended period of service cancellation caused by high winds and seas.

Tallink Express

By far the largest operator on the route, with four ships and two hydrofoils, is Tallink. Last year the company carried almost 60% of total passenger traffic and over 90% of all vehicle traffic.

The original Tallink introduced its first ferry between Helsinki and Tallinn in 1989, the line now operating under the same banner is the result of a merger last year between that company and Inreko Estonian New Line.

The company also markets holiday and excursion packages to Estonia and this year it introduced a ferry on a route between Tallinn and the German city of Travemunde.

The hydrofoil service, which has been marketed as Tallink Express since the merger, continues to be contributed to the joint operation by the Estonian based Inreko.

The first fast ferries to appear on the Helsinki-Tallinn route were a pair of Kometa hydrofoils owned by Helta, another Estonian company. During 1991 the first of the present vessels, the 44.2m Cyclone hydrofoil *Liisa*, entered service with Inreko.

This is an interesting vessel. Launched in 1986 by the Feodosia Shipbuilding Association, the Ukrainian yard now known as Morye, it was initially operated on a trial basis by the Black Sea Shipping Company.

The design is unlike any other, there are two passenger decks but only one main engine - an M37 gas turbine, based on a unit developed for the Soviet Navy, that has a continuous rating of 5,150 kW and a maximum rating of 5,600 kW. A second gas turbine, a 100 kW unit, is used to power up the main engine.

The idea of operating an ex-Soviet prototype hydrofoil

powered by a gas turbine on a regular passenger service seems inconceivable, but Inreko general director Enn Rohula reports that the Cyclone has been virtually trouble free since it entered service and has proved to be more reliable than two Kolkhidas operated during 1992-1993. He points out that Estonia is geographically close to Russia, so obtaining spares is not a problem, and Inreko continues to maintain good contacts with the Morye yard.

The company is hardly overstressing the engine either. Officially, the service speed of the Cyclone is 43 knots but Inreko operates it at 35-37 knots to match the service speed of the company' s other hydrofoil.

In fact, the maximum speed of the vessel is at least 47 knots and Enn Rohula says that the inaugural service crossing from Tallinn was completed in only 57 minutes. (Editor's Note: See IHS Newsletter, Summer 1992, pages 7-9 for story on Cyclone and other Russian hydrofoils.) *Liisa* is equipped for slightly less than its standard design capacity of 250 passengers. There are 220 seats on board, two thirds of them in three saloons on the upper deck and the remainder in a midships saloon on the lower deck.

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KVAERNER FJELLSTRAND PREPARES FOR THE FUTURE

(From Fast Ferry International, June 1994)

The last four months of 1993 were particularly good for Kvaerner Fjellstrand, one of the three companies that make up Kvaerner Fast Ferries. In fact, in terms of orders received, almost the whole of last year was good for both Kvaerner Fjellstrand and Kvaerner Fjellstrand in Singapore. But, considering the events of 1991-1992, virtually any upturn in business would have been good.

The situation is neatly summarized in Kvaerner's most recent annual report: "As in the previous two years, there was a mismatch in 1993 between productive capacity and the demand for passenger ferries. Kvaerner Fjellstrand at Omastrand began the year by laying off many employees. Most of our European competitors ceased to operate. The yards at Omastrand and Singapore both suffered losses.

Kvaerner Fjellstrand Shipping, which began ferry operations with new Kvaerner built catamarans at the 1991-92 year end, was closed down in the autumn of 1993 after taking big losses.

Kvaerner Mandal, assigned to build nine mine countermeasure craft for the Norwegian Navy, has had problems with the progress and the costs of the project. on which it made a considerable loss in 1993.

"As 1993 wore on, however, sales improved. Whereas external sales in 1991 and 1992 amounted to two and five 40m Flying Cat catamarans respectively, contracts were concluded for 14 such vessels last year. Towards the end of the year, Kvaerner also won a contract for two 35m FoilCat catamarans, a contract which is a technological and marketing breakthrough. The two yards thus embarked on 1994 in a happier position with regard to orders."

The Kvaerner Group

Kvaerner Fjellstrand's salvation was that it is a subsidiary of a wealthy parent. Kvaerner is Norway's largest privately owned industrial group, it currently has about 100 companies around the world and employs almost 24,000 people plus over 4,000 others on a contract basis.

During the past six years significant changes have occurred as the company embarked on an acquisitions and restructuring policy. There has been a four fold increase in sales and profits while the proportion of total staff employed overseas has increased from 10% to 60%.

Kvaerner's activities are now concentrated in five main business areas: shipbuilding, mechanical engineering, oil and gas, pulping technology and shipping. In 1993 the operating revenue of the group totalled NOK 24,583 million and profit before tax was NOK 1,319 million.

One of the biggest turnarounds has taken place in shipbuilding. During the 1980s the group had divested itself of all its yards but it now owns 12 in six countries, making it the largest shipbuilding company in Europe and the fifth largest in the world.

However, Kvaerner's fast ferry activities only became part of the shipbuilding business at the beginning of this year. Before then they were part of the mechanical engineering business area.

In 1993 this activity lost NOK 194 million, partly because, the annual report explains, "high adaption and restructuring costs at Kvaerner Energy and in our high speed vessel operations have been charged against profits."

Kvaerner Fast Ferries is the group's high speed ship division and encompasses the Kvaerner Fjellstrand yard in Omastrand, the Kvaerner Fjellstrand (S) yard in Singapore and the Kvaerner Mandal yard in Gismeroya. Until last autumn, it was also responsible for Kvaerner Fjellstrand Shipping. At present, the three yards employ a total of 790 people, approximately 40 of whom are contractors. There are 210 at Omastrand, 240 in Singapore and 340 at Gismeroya.

Kvaerner Fjellstrand

Fjellstrand was purchased by Kvaerner at the beginning of 1989. Between 1985 and 1991 the Omastrand yard built twenty eight 38.8m catamarans and delivered 33, the construction of five were sub contracted to another local company.

The Flying Cat 40m design was introduced in 1989, the first two vessels being ordered the same year and delivered in 1990 as both 38.8m and Flying Cat vessels were built during the transitional phase. By the middle of 1990 production was concentrated on the Flying Cat.

In Singapore, meanwhile, a new yard was under construction. This was finished in April 1991 and the first Flying Cat was launched there a year later. Kvaerner's intention was to relocate production of Flying Cats to Singapore and base production of the new FoilCat 40m foil assisted catamaran in Omastrand, where higher costs make the yard better suited to more technically advanced designs.

Unfortunately, market conditions changed at about this time and when trials of the first FoilCat got underway, towards the end of 1991, it soon became obvious that plans for an early entry into service and production would have to be delayed.

As Bent Hammel, the president of Kvaerner Fast Ferries, says, the company was faced with the prospect of owning two yards having a normal annual production of six Flying Cats each, and maximum total capability of up to 15, at a time when the market in Europe for this size of vessel had all but collapsed. Although demand in Asia had become relatively strong, that market did not want a luxury product.

The orders for 14 Flying Cats and two FoilCats placed during 1993 were worth over US$100 million. Now, Bent Hammel reports. "Our goal is to sell just as many Flying Cats as last year. In addition, we ought to sell two JumboCats."

Frames for the first FoilCat 35m were cut at Omastrand last month. With the vessel finally in production and the prospect of the first order for a JumboCat being confirmed within weeks. Kvaerner Fast Ferries anticipates that two stock Flying Cats currently nearing completion at the yard will be the last to be built there.

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KOMETA HYDROFOILS CONTINUE TO APPEAR IN GREEK WATERS

(From Fast Ferry International, September 1994)

It has always been difficult to keep track of ferry activities in Greek waters. Timetables are rarely published, vessels are transferred between areas at short notice, many operators are not adept at volunteering information about their services. The situation with fast ferries with their greater operational flexibility, is even worse.

But since our last survey of Greek companies, published two years ago, the problem has been compounded by the number of low cost Kometa hydrofoils that have been arriving from the countries that previously made up the Soviet Union. Many of these have been acquired by newly established companies and introduced throughout Greece.

This summer there were at least 18 companies in the country operating at least 75 fast ferries. Of these, 68 were hydrofoils built in the former Soviet Union. Fifty-six of these were Kometas. Two years ago, there were 49 fast ferries in Greek waters, 38 of which were Kometas. Five years ago, there were 25 fast ferries, 21 of which were Kometas - and the majority of those were being operated by just one company.

Ceres

The operator, Ceres, has remained relatively quiet during the past two years, preferring to wait and see how the fast ferry market will develop after the present surge of activity and seeming over capacity on some routes fuelled by cheap imports has calmed down.

The company's Argosaronic/Sporades networks and Kea-Kythnos route are as they were two years ago, the only change in the fleet has been the acquisition of another Kolkhida hydrofoil a year ago. Even so, Ceres's fleet of 24 Kometas, four Kolkhidas and a single Fjellstrand Flying Cat catamaran is still more than double the size of that of the second largest fast ferry operator in the country.

Ilio Lines

The operator that has displayed the most spectacular growth in recent years has been Ilio Lines. This introduced five Kometas in 1991 on routes from Rafina, a port near Athens, to the Cyclades islands and mainland towns along the Evian coast.

Eight more hydrofoils, five Kometas and three Kolkhidas, followed in 1992 and last year the company expanded its routes to include the Dodecanese islands, the East Aegean and the northeast mainland. The fleet was reduced by one vessel a year ago when a Kometa was declared a total loss after an accident.

An option is also held on an Olympia hydrofoil and permission has been obtained to operate services in eastern Greece between Patras and the Ionian islands, although these have yet to be introduced.

Ilio Lines has a relatively complicated network. Generally, the company's routes are relatively long journeys of four or five hours are not uncommon, and are operated during the peak summer months at frequencies of one or two a day on the more popular ones and less on the others.

To maintain its peak July-September summer schedules, Ilio Lines needs at least nine hydrofoils - six for the Cyclades / Evian services (four based in Rafina, one in Syros and one in Santorini [Thira]) and three for the Dodecanese/East Aegean services (one based in Kalimnos, Samos and Lesbos).

Ilio Lines says that it continues to operate its Kometas in up to Force 7 winds and its Kolkhidas in up to Force 8 winds. But even in the summer, with the Meltemi blowing, services can be cancelled. The company reports that last year it lost five trips on the Cyclades routes during July and ten during August.

Hermes

Hermes is another operator that has been establishing hydrofoil services to the Cyclades and Dodecanese recently. However, instead of acquiring Kometas from the former Soviet Union, the company has been buying Rodriquez vessels from companies in the British Isles.

Last year it purchased two RHS 70s from Red Funnel and an RHS 140 from Condor. Earlier this year it bought an RHS 160, also from Condor. During this summer, the RHS 160 and one RHS 70 were being operated between Rafina and Cyclades.

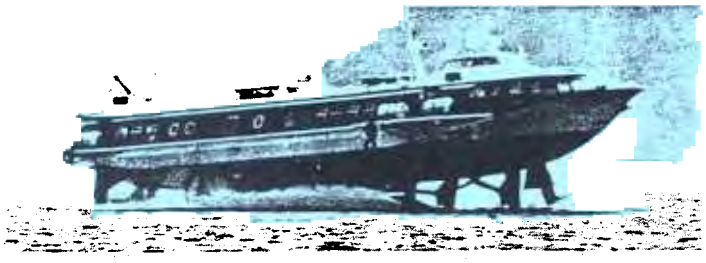
Municipality of Piraeus

In April this year, the Municipality of Piraeus introduced its own fast ferry service in an attempt to overcome the chronic traffic congestion in the town.

A Meteor hydrofoil was leased from Nattem Passenger Lines and entered service on a local route from Piraeus to the island of Salamis. The journey time, even including a ten minute hullborne transit of the port is only 20 minute, allowing hourly departures to be operated from both ends of the route.

Zeus Lines

Another operator that has introduced tourist excursions within the Dodecanese and to Turkey is Zeus Lines. This has three Kometas, acquired in 1992, based in Rhodes and operates daily return services to Symi and Marmaris.



Zues Lines KOMETA "FLYING ZEUS"

Established Operators

The only one of the longer established Greek companies that has increased its fleet during the past two years is Dodecanese Hydrofoils.

This continues to operate two Kometas on routes in the Dodecanese, from Rhodes to Astypalilia, Nissiros, Kalimnos, Kos, Symi and Tilos; from Kos to Kalimnos, Leros, Nissiros, Patmos, Samos and Fourni; and from Lipsi to Patmos and Agathonisi. However, the company now also has four other Kometas that are operated on a time charter basis on cruises throughout the Dodecanese.

MORYE OLYMPIA HYDROFOIL COMPLETES FIRST YEAR OF SERVICE

(From Fast Ferry International, October 1994)

Although the styling of Morye's Olympia bears a passing resemblance to some of the hydrofoils previously produced in the former Soviet Union, the design has a greater capacity, higher performance and more refinement than those earlier vessels.

The first Olympia, *Laura*, has now been in service on the Helsinki-Tallinn route with Tallink Express for over a year and the second was shipped from the Morye yard in Feodosia, Ukraine, to the same operator in September. (Editor's Note: See IHS Newsletter, Summer 1992, pages 7-9 for story on Cyclone and other Russian hydrofoils.)

According to Morye, the hydrofoil is "designed for operation on routes in open seas up to 50 miles from a port of refuge or up to 100 miles in land locked seas and large lakes, with a permissible distance between two ports of refuge up to 200 miles."

The company reports a foilborne speed of 37 knots can be maintained in conditions up to Force 3 or Sea State 2 and states that the *Olympia* is capable of maintaining normal service in up to Force 6 conditions and waveheights of up to 2.5m-3.0m.

Hull

Both the hull and superstructure are of riveted and welded construction with use being made of pressed panels and aluminium magnesium alloy sheets. Beneath the main deck, the hull is subdivided by bulkheads into 11 compartments, all of which are accessible through manholes or hatches.

The transverse framing in the hull comprises T and T angle web frames at 700mm spacing, the transverse watertight bulkheads are pressed panels. The web frames in the superstructure are I sections at 1,400mm spacing. the transverse and longitudinal bulkheads above the main deck are pressed panels and 2-3mm sheeting. Longitudinal framing along the bottom, sides and decks consists of stiffeners, keelsons, stringers and carlings.

Foils

The Olympia has two main lifting foils, a midships foil and a stabilizer behind the forward foil. All are of welded construction. The fore and aft foils, and the lower sections of their struts, are stainless steel. The midship foil and struts, and the stabilizer, are aluminium-magnesium alloy.

The whole width of the bow foil and the side sections of the aft foil are fitted with flaps which are activated as part of the ride control system. Morye advises that this need only be used in conditions above Sea State 2.

There are two rudders on the craft, one forward having an area of 1.6 sq.m and one aft having an area of 2.4 sq.m. The yard says that when foilborne in calm water and still air, the Olympia has a steady turning diameter of not more than 20 vessel lengths. The turning diameter hullborne, with the main engines running at 800-1,000 rpm, is no more than eight vessel lengths.

Main Engines

The standard main engine package for the Olympia is a pair of MTU 16V 396 TE74L diesels, rated at 2,000 kW at 2,000 rpm, each driving a propeller via a ZF BW 755S gearbox.

The wheelhouse is equipped for two men. A minimum crew of six is recommended: captain, engineer, motorman, two seamen and a cabin attendant.

Passenger Saloons

The main access to the passenger saloons is forward, port and starboard, across the foil guards. In standard configuration, the Olympia has a total of 250 seats at a pitch of 900mm. There would be 54 seats in the bow saloon, 142 seats in the main saloon and 54 seats in the aft saloon.

There are luggage stowage areas in the entrance foyer and towards the rear, three toilets midships port and starboard and a crew day room port and starboard. Unusually, a mixed traffic version of the Olympia is also available in which the aft passenger saloon is replaced by a deck capable of carrying five or six cars.

Tallink Express's Olympia, however, has been fitted out with more spacious accommodation for 200 passengers. The bow saloon has 34 'business class' seats, there are 118 seats in the main saloon and 48 seats plus a bar in the aft saloon. The Olympia also has a small open deck aft but Tallink Express does not allow passengers to visit this while the vessel is at sea.

Future Deliveries

The company is currently furnishing its second Olympia, which it will either put into service in the Baltic next year or sell to another operator. There are also four more Olympia hulls in various states of construction at Morye's yard. All are available and when orders are finalized, they could be completed either in the Ukraine or elsewhere.

DIGGING UP THE REASON FOR THE ROUND, FLAT BEAK

(By Rick Weiss of the Washington Post)

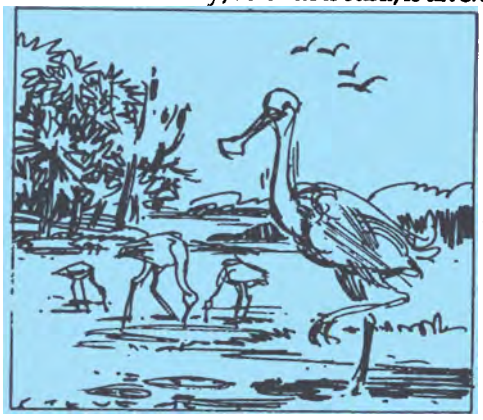
To look at a spoonbill, the semi-tropical wading bird of the genus Platalea, is to see Mother Nature in one of her sillier moods. The creature's bill is flattened as though run over by a truck, and it grows broader rather than narrower at the far end. Avian biologists for decades have tried to come up with a respectable rationale for the spatulate beak.

"Its bill is conspicuous and really almost comical," said Keith Bildstein, an an avian, ecologist at the Hawk Mountain sanctuary west of Philadelphia. "And because it looks so unusual and ungainly, it just begged for an explanation."

Creating Lift

But it took an aerospace engineer to explain the functional elegance of the spoonbill's bill: Like an airplane wing, it creates lift—not to aid in flight, but to draw food off the bottom and into the bird's mouth.

The discovery, scientists said, is an excellent example of the power of interdisciplinary study - and in particular the field of biomechanics, which uses the laws of physics to analyze biological problems behind even the most seemingly capricious life form, biomechanical ecologists assert, is an engineering problem successfully resolved.



The spoonbill revealed its structural secrets in Haifa, Israel, soon after Daniel Weihs, an engineer at Technion research institute, watched a film about the birds and became curious about their unusual feeding behavior.

Sweeping Side To Side

Unlike its close relatives, storks and herons - which jab their heads forward to snatch prey with long, pointed bills spoonbills sweep their partially open bills from left to right as they wade, capturing small crustaceans such as snails suspended in the water and occasionally nabbing a small fish. That they could catch much of anything with such a casual effort was for some biologists hard to believe.

"Nobody had suggested any theory about why they sweep, and how they actually capture the fish or invertebrates they eat," said Gadi Katzir, a biologist at the University of Haifa in Israel, who collaborated with the engineer on the spoonbill project.

"Being an aerospace engineer, (Weihs) got interested in the problem of why they sweep their bill back and forth, and he began to wonder whether the bill acted as a hydrofoil, or an underwater wing."

The Hydrofoil Effect

Hydrofoils are structures that are (relatively) flat on one side and curved outward on the other. An airplane wing is the classic example, but the spoonbill's bill reveals the same pattern. Having studied aerospace design as well as the aerodynamics of bird flight in wind tunnels, Weihs recognized that the upward lifting forces — called Bernoulli forces — that keep planes and birds in flight might also be at work as the spoonbill's bill sliced sideways through the water.

Weihs knew that the combination of this upward force and the forward motion of an airplane can cause spiral flows behind the tips of a wing, a phenomenon known in aerodynamics as the wingtip vortex effect.

Weihs hypothesized that the same effect would occur near the end of a spoonbill's bill as it cut through the water, creating what he dubbed a "bill-tip vortex."

Using standard spoonbill dimensions and bill-sweeping speeds, Weihs estimated that Bernoulli forces generated by the sweeping of the spoonbill could cause an upward sort of "wind shear" a few inches beneath the bill and a series of vortices that together are sufficient to lift small objects off the bottom and into the water in front of the bird's mouth.

Testing The Theory

It looked great on paper, but was it true? Weihs and Katzir tested the hypothesis in a novel pair of experiments, one with a captive spoonbill and the other with a model made from a spoonbill skull and a bicycle wheel.

Working in the University of Tel Aviv Zoological Garden, the two researchers filmed the sweeping behavior of a live male spoonbill in a shallow pool, then analyzed the bird's movements frame by frame. To ease their video analysis, they painted a series of white stripes across the bird's bill before filming.

"It looked for a while like a new species," Katzir said. Video measurements of bill immersion depth, angle of immersion, sweep velocity and gape allowed precise calculations confirming that significant bill-tip vortices were probably being created.

Visualizing The Vortices

But the acid test would be to visualize the vortices themselves and to see whether these funnels could actually lift small food items from the bottom. This called for more cooperation than could reasonably be expected of a bird, so the scientists constructed a model.

They attached a spoonbill skull — with bill intact — to the outer rim of a bicycle wheel and mounted the wheel horizontally in a pool of water. By rotating the wheel back and forth, they simulated the natural sweeping motion of a foraging spoonbill. Then they lined up a collection of small snails on the pool bottom below the bill and spun a few sweeps of the wheel.

On every occasion, sweeping motions of the mechanically operated bill caused the shells to move upward and forward by a few inches, frequently tumbling up and over in one or more loops. The vortices were real.

The results, Weihs and Katzir write in the March issue of Animal Behaviour, "clearly indicate that the bill sweeping of spoonbills has a hydrodynamic function." And, they conclude, "This is the first reported case of an avian bill being used as a hydrofoil."

LETTERS TO THE EDITOR

Haylesley, Western Hill Park Upton Grey
Basingstoke, Hampshire
England

4 November 1994

Dear Mr. Meyer,

I was interested to receive your notice regarding plans for a possible 25th anniversary celebration of the IHS.

It may be of interest to you to know that I, along with Juanita Kalerghi and Mark Thornton, founded the original Society.

I recall that there was also a man from Lloyd's Register involved who subsequently died, at a young age. Regrettably, I can't remember his name.

Somewhere among my papers I'm sure I must have my notes on the early meetings of the Society. I keep promising myself to find them. If indeed they are still in existence and I do find anything of archival value I will see that you receive a copy.

As Mark Thornton died some years ago, I believe that only myself and Juanita Kalerghi survive from the original team that set up the IHS.

My own association with hydrofoils resulted from my original work in Canada on FHE at the Defense Research Establishment Atlantic, Nova Scotia. On my return to the UK, after two years in Canada, I began writing in a freelance capacity for "Hovering Craft and Hydrofoil" as it was then called. Having also worked on early hovercraft research at the National Physics Laboratory in the UK, my "foot-in-both-camps" qualified me to write on both subjects.

I trust you will find these few comments of interest.

Yours sincerely,
Derek Deere, Eur. Ing., C.Eng., FRINA

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Aero-Marine Engineering
9727 Hagel Circle
Lorton, VA 22079

December 1, 1994

Editor
The International Hydrofoil's News Letter
International Hydrofoil Society
P.O. Box 51
Cabin John, MD 20818

Dear Captain John King or Current Editor:

I have started "Aero-Marine Engineering", a marine engineering consulting company, specializing in the design, development, and engineering of advanced marine vehicles and low speed aerodynamics.

Your readers will be interested in some of the work my firm will be doing in the future. Enclosed with this letter is our news release concerning "Aero-Marine Engineering" formation. Please inform me where we should direct our future news releases, if you are not the correct person. [Editor's Note: Any member interested in this material can contact Mr. Ginsberg directly.]

I would also like to get some more information on your society. I am currently in the U.S. Hovercraft Society and have attend some of the joint meetings.

I can be reached at the address above or by phone/fax at (703) 550-1236. I also can be reach by E-Mail on compuserve at 76660,3274.

Yours Truly,
Harold Ginsberg

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17 Penton Hall Penton
Hook Road, Staines.
MIDDX TW18 2HR, U.K.

December 3 1994.

The Editor
The International Hydrofoil Society.
Box 51, Cabin John, Maryland, USA

Dear Sirs,

I would acknowledge receipt of your newsletter dated Autumn 1994 for which I thank your goodselves.

My conscience compels me to place on record my feeling of self demeanment in as much as I never grant you the courtesy of acknowledgment of receipt or feedback. Such behaviour is unacceptable for I apologise.

Reflecting upon the long association with the I.H.S. especially with Cdr Mark and his pet craft the undersigned still enjoys reading about the latest technology with a hint of "IF ONLY" from my end.

The letter from Mr. W. R. Frank reminded me of the efforts on behalf of Mr. Hamilton Walker the New Zealand inventor. The Air-Rider vessel was built (18' model) and shown at the Brighton Exhibition. Purely as a matter of interest I am walking down Memory Lane and reading the report of that occasion in the copy of "High speed surface Craft" dated August 1980. At this precise moment the photograph of Mr. & Mrs. Lee Barhaml - winner of the Peter Dorey Silver Cup - is staring me in the face. Happy Days!

I regret having to report after many years that although two models were made and interest was shown, films were produced that proved that theory, I was made to understand that unless I was able to pass the golden egg around, the goose would be on standby. But then!, is this not the oldest story in the book.

Please allow me once again to thank you for your kindness in "Keeping us in the Picture".

With every good wish and appreciation, together with a Happy Peaceful Festive Season.

Very Sincerely,
Bill Witt