The NEWSLETTER
International Hydrofoil Society
PO Box 157, Hume, VA 22639, USA

Summer 2017
Editor: Scott Weidle
Contributors: Mark Bebar, Ray Vellinga, Worldwide Hydrofoil Community

SUSTAINING MEMBERS

NAIAD DYNAMICS

MAPC

IHS OFFICERS 2017

Ray Vellinga	President
Mark Bebar	Vice President
Roger Schaffer	Treasurer
Joel Roberts	Acting Secretary
Bill White	Technical Director
Scott Weidle	Editor

BOARD OF DIRECTORS

2015-2018	2016-2019
Mark Bebar	Harry Larsen
David Patch	Tom Lang
Roger Schaffer	Joel Roberts
Ray Vellinga	Bill White

2014-2017
Joel Billingsley
Martin Grimm
Capt Frank Horn
Scott Weidle

CONTENTS

DISCLAIMER

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

PRESIDENT'S REPORT

First, major thanks to the team of:

Mark Bebar: Vice President and co-chairman of the Mandles Prize
Bill White: Web page
Roger Schaefer: Treasurer
Scott Weidle: Newsletter Editor
Harry Larsen: SmugMug editor
Martin Grimm: special projects
All 11 Judges for the Mandles Prize (generally requesting anonymity)

Welcome back to IHS activity: Scott Smith, accomplished Florida hydrofoiler.

This has been a terrific year for hydrofoils in general and the International Hydrofoil Society in particular. New designs thrilled enthusiasts. For example, electrically powered surfboards made the market, sail powered hydrofoil boards of various configurations continued to gain popularity, and several classes of sailing hydrofoil boats engaged in international racing events. Moths and foiling catamarans attract worldwide competitors, but the biggest and most exciting phenomenon is the America's Cup race in Bermuda. Look for my article on this event in this newsletter.

Other big news is the dramatic increase in membership of IHS. Midway through 2016 I received approval from the board to waive the $30 annual membership fee. We have significant cash reserves to carry us for several years and asking

for more money took second place to the need to be broadly recognized in the world of hydrofoils. Dropping the dues requirement made it possible to bring in a new member without any specific initiative being demanded of him. Typically, a qualified individual was welcomed into the Society. Every new member was assured that there will be no obligation and that all personal information will be kept confidential.

This way of bring in new members follows a long-standing practice by past president John Meyer and others of informing qualified hydrofoilers that they are special, they have been awarded, the award is in the mail, they are now a member of IHS, and the annual $30 dues are waived. Most have returned thanks, but not everyone acknowledges the award or the membership. For example, I have made several personal attempts while in Paris over the years to contact a certain famous and accomplished French hydrofoil sailor granted awards by past administrations. No luck. No response. That is one good reason why included in each new "welcome" there is always an invitation to drop out anytime with a simple request (and perhaps save me from chasing around some foreign capital). Only one such request has been received. If you have received a "welcome" email, we sincerely wish you to feel welcomed, and to enjoy our free and valuable services, with no obligation.

Individuals qualified for membership include those who demonstrate an affection for hydrofoils, naval architects, academics, engineers, designers, manufacturers, military, aviators, writers, and filmmakers. Partly because of the Mandles Prize, the largest category so far is academics with 715 members. The total number of members is approaching 2,400. Before taking office, our short list of members was perhaps 300, although it was not known how many of those members were alive and foiling. Some of those individuals date back to our founding in 1970, and many were associated with inactive military projects.

Currently, our primary sources of income are the annual contributions received from our three generous Sustaining Members, NAIAD Dynamics, MAPC, and Island Engineering. Any company or individual reading this is welcome to come aboard with a modest annual tax deductable donation. In return, we will publish articles, provide advertisement, and create publicity. Later this year, time permitting, I plan to make a few phone calls and perhaps expand this program.

A major advantage to being a member of the IHS is access to all our information and documents about hydrofoils. Much of this can be found in past newsletters, which have been traditionally password protected. Because you have a copy of this newsletter it is indicated that you are a member, so here are the passwords from past newsletters.

2015-2 = hydros
2015-1 = quadrofoil
2014-3 = volga275
2014-2 = shipshape2014
2014-1 = bringtalent
2013-4 = memberscount
2013-3 = sunnyday
2013-2 = flyingships
2013-1 = hydrofoilworld

A new idea for getting the archived newsletters out to the total membership is to open a new, discrete web site linked to our main web site. This would be a simplified site that could be maintained by one interested member. Bill White and I will work with the individual to supply a program and help him learn the needed skills. It's a super opportunity to learn and improve web skills. Do I hear a volunteer?

A big reason for the high number of academic members is their interest or association with the Martin Mandles Prize for Hydrofoil Excellence. Martinn and Connie Mandles are continuing for the fourth year to provide the Prize's financing. Winning students from sponsoring universities have been granted a portion of the annual $4,500 divided between the first, second, or third prizes. The competition is truly international with entries from Australia, Tasmania, Switzerland, Netherlands, India, England, and of course the United States. This year we have eight students competing. Here is a list of the 14 competing universities for the last four years:

Australian Maritime College, University of Tasmania
Cedarville University, Ohio, USA
École Polytechnique Federale de Lausanne, Switzerland
Florida Institute of Technology, Melbourne, Australia

Massachusetts Institute of Technology, Massachusetts, USA
Stevens Institute of Technology, Hoboken, New Jersey, USA
Swiss Federal Institute of Technology Zurich, Switzerland
Technical University of Delft, Netherlands
Tolani Maritime Institute, Pune, India
University of New Orleans, Louisianna, USA
University of New South Wales, Australia
University of Southampton, England
US Naval Academy, Annapolis, Maryland, USA
Webb Institute, Glen Cove, NY, USA

All the winning papers may be seen at www.foils.org. Next year's Prize contestants are encouraged to contact us now and begin preparations today. The announcement and rules for the 2018 Mandles Prize will be posted on our website by October 2017.

In other news, the 8,000 photos displayed in our Phanfare program were transferred to SmugMug by Harry Larsen. There a still a few bugs to be worked out, but overall the move was an improvement. Most of all, I like the large photos for each classification; much more attractive than the small icons from before.

Our new YouTube account, that I opened a few months back is continuing to draw attention. There are five videos posted, and we have about 16,000 views to date. Among them, board member, Dr. Tom Lang, and I made two videos featuring his SWATH and SSP Ships. SWATH is short for Small Waterplane Area Twin Hulled Craft, and SSP for Stable Submerged Platform. Tom has made several dramatic contributions to the world of hydrofoils including about 50 of his ships working across the globe.

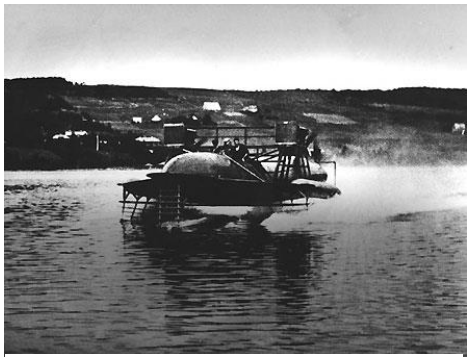
A week ago, I started reading his latest book: An Engineer's Unified Theory of Physics that answers some of the questions left from Einstein's work. Tom, who has 4 degrees including a Ph.D in aerospace engineering from Pennsylvania State U, is working with Cal Tech to have his theories receive broader recognition in the academic community.

To navigate to our channel, go to youtube.com and in the search box type International Hydrofoil. Or visit the channel:

The Facebook page, created less than one year ago by Bill White, continues to grow and attract increasing attention. Simply type Facebook.com into your URL and then type in the search bar, International Hydrofoil. Or go to the page.

Any member is encouraged to post material to our YouTube or Facebook locations. If problems or doubts arise, contact me at IHSpresident@gmail.com

Mark Bebar and Martin Grimm continue to communicate with Sean Balwin as he develops the planning for the Fall 2019 hydrofoil celebration in Baddeck, Nova Scotia. Sean is the grandson of Frederick W. "Casey" Baldwin who in 1919 worked with Alexander Graham Bell aboard the HD-4 hydrofoil boat. On September 9th, 1919, on the Bra D'Or Lakes at Baddeck, Nova Scotia, the HD-4 set a world marine speed record of 70.86 miles per hour. Unfortunately, a year later that record was beat by Gar Wood in a hydroplane named Miss America. For details go to Wikipedia



HD-4 at Baddeck, Nova Scotia in 1919, Wikipedia

The project now underway is to have an International Hydrofoil Society summer reunion at Baddeck. Featured at the event may be a hydrofoil Class C catamaran regatta, home-built powered hydrofoils, human-powered hydrofoil, kite board foils, and professionally built foil craft. All members and friends are encouraged to attend. Contact Mark or Martin for details as they become available.

Now for something completely different. A couple of years back at a social event in Paris, I met a documentary film director and producer Charles de Lartigue. We talked and discovered mutual likings of sailing and hydrofoils.

Charles took an interest in me because of my position in the International Hydrofoil Society. I

was initially curious about Charles because he had created a film called Yachting 150 ans de tradition. The film includes footage of the America's Cup race. Of course, the America's Cup boats now run on hydrofoils so he and I have common ground. When Charles discovered that I live near the San Diego Yacht Club, and had reciprocal privileges, he asked if I knew or could get in contact with the America's Cup winner Dennis Conner. "I could try but I didn't know him". So, one day Charles showed up at my doorstep, and we hopped in my car and drove to San Diego Yacht Club. We hung around for a two afternoons looking for Dennis and had no luck. End of story?

By coincidence a few months later I was talking to a lawyer friend, Chris Wenther, and the conversation turned to sailing. I told him about the work in progress on a sailing movie of the America's Cup. Chris chirped, "America's Cup, I'm their lawyer and I happen to be good friends with Dennis Conner". So, he made for us an appointment with Connor, Charles and his cameraman flew over, and the four of us sat down at the SDYC and made a 20 minute video of Dennis telling how they won the Cup in the good old days. Then Charles filmed me advocating the importance of hydrofoils to the Cup boats (which may or may not end up on the cutting room floor).

Since then I have shown one of Charles' films at The Gig Harbor Yacht Club and have a tentative date to show it again at the San Diego Yacht Club. I always represent myself as the President of the IHS and stress the importance of hydrofoils in the current competition. And we usually get a few new members.

This June again in Paris, Charles and I worked on the English monologue for his new AC documentary. He has completed the promotional trailer and is looking for $$ to complete the 90-minute version. Any angels out there?

Can't get enough music about hydrofoils? Go to Youtube.com and search for Hydrofoil - The Musical. It's by Osho. You'll love it.

Want to be more involved in our not-for-profit Society? We welcome recruits for Newsletter, Facebook page, Web site, and the Mandles Prize promotion and judging. This is a great opportunity for on-the-job training of important skills, and to help promote the exciting concept of hydrofoil flying.

DUES ARE HISTORY

As a key part of the incoming new administration, annual dues have been eliminated. The new program is to rely on Sustaining Member and donations from any member that volunteers to make tax deductible. Advertising in the Newsletter, Web Page, and Facebook will be made available for nominal contributions. Please inquire with Ray Vellinga to place an advertisement.

HYDROFOIL SUP Q&A

On June 20th, a friend of the International Hydrofoil Society, Don, asked the following question on our Bulletin Board Service at foils.org:

Q: The current rage in Stand-Up Paddle-boarding (SUP) is hydrofoiling. You have to balance fore and aft on the board to get the board up on foils and keep it leveled out. Can anyone think of a way to have a foil that articulate and have the angle of attack controlled by a wand similar to the Moth class? Any ideas would be greatly appreciated.

Long term member, Scott Smith, replied with a clear, concise, and intuitive answer:

A: That would be an interesting challenge. The main problem is the way that the SUP hydrofoil is controlled. All hydrofoils need to be controlled in pitch, roll, and yaw, as well as height above water. Height above water also falls into 2 categories, contouring and platforming. In contouring mode, the vessel (or board) follows the up and down of the waves, maintaining constant height above the face of the wave as it goes up and down. In platforming, the altitude of the vessel stays fairly constant, so the foils are deep as you cross the crest of the wave, and shallow as you cross the trough between waves.

You can try to control all these things yourself, or let the foil system control some or all of them. In the SUP board, there is only 1 wing (it may look like 2, but it really acts like 1) and it has no inherent stability. The operator controls everything

with his balance. The pitch of the board, combined with forward movement, controls the height above water. To use a system like the wand you mentioned, it will have to control pitch as well as height. That presents three problems. The operator won't be able to change between contouring and platforming unless you add a manual override to the pitch sensor (wand). If the waves are small and you are platforming, then a big wave comes along you have to switch to contouring. The second problem has to do with turning. You need to add pitch during a turn. I won't get into the physics here, but trust me, pilots have to pull back on the stick when they turn a plane. The third is that the foil on these SUP boards is essentially 1 wing. Adding an effective control surface to a single wing isn't impossible, but nearly so. It's one of the reasons you don't see a lot of 'flying wing' aircraft around.

Hydrofoil Stand-Up Paddleboard (SUP)
Photo credit: http://www.lojasupkite.pt

So, you decided to add another strut to the front (or back) of the board, with a wand. Now you have to steer that strut, as well as be able to influence the wand to maintain control and the ability to turn. You mentioned the foiler moth, it is a good example. The foil on the keel provides lift, balance and sail control handles roll. The controllable foil on the rudder controls yaw, pitch, and height above the water. Steer with the tiller, and turn the handle on it to control pitch/height above water. If you don't mind having some kind of 2 axis tiller on your SUP board, you could add a wand for added stability and an additional control to influence what the wand is doing. The Yamaha OU32 had a wand to automate pitch control, but pushing or pulling on the steering wheel would allow the pilot additional influence. So that linkage is known, and fairly simple. To see the OU32 click on visit YouTube

So, what would it look like and act like? Well, if you wanted to add stability to a unicycle, you could add a second wheel. But then it would be a bicycle. And it isn't just what it looks like. A unicycle is all about body balance and pedal control. A bicycle is all about forward movement and steering for control. A unicycle can pivot 90 degrees on its tire without moving anywhere. A bicycle can only do that if you lift one wheel off the ground. If you want a bicycle to stand up when it isn't moving, add another wheel. Now it is a tricycle and the controls and stability change again.

Adding pitch control to a SUP board would mean adding foils, and controls. It could be done if you don't mind having a 2-axis tiller, or some handlebars, but would you want to ride this board standing up, with handlebars? By the time you added what you needed to make this more stable, you might as well sit down on it. Because by then it would be more like a hydrofoil kayak than a SUP board.

The human body and brain have an amazing ability to learn and control things. Personally, I don't have the coordination for a SUP hydrofoil, or a foiler moth for that matter. But the foil systems used on the SUP board, air chair, etc. are simple, versatile and efficient because the human performs all the control needed.

Over the years I have discovered one universal truth about hydrofoil boats. They always look simpler than they really are. If hydrofoils were as simple as they looked, there would be lots of them around. But when you do the research you begin to see there are far more failed attempts than successful hydrofoil boats. Lately there has been a proliferation in hydrofoils on SUP boards, surfboards, knee-boards, etc. But if you look closely you will notice they all use the same basic foil design.

SAILOR'S PAGE

A-Class Foiling Catamarans

Recent NOOD Regatta held February 17-19, 2017 in St. Petersburg, Florida featured nearly 40 A-class foiling catamarans. Find out more at Sailing World:

Technical Analysis of the 35th America's Cup Race

By Ray Vellinga

In June, Patricia and I visited the America's Cup Races on the island of Bermuda. We were enroute to Barcelona from Port Canaveral aboard the NCL cruise ship, Epic. On the island, we witnessed practice runs that were to be followed by the Louis Vuitton elimination races. Seven countries compete to become the Cup Challenger. The winner, Emirates Team New Zealand, would sail against the reining Cup holder, Oracle USA.

After returning to the USA, I resumed following the races in my living room. NBC provided spectacular coverage with aerial video, graphics, and interviews. Here are some observations after four races in two days mid-June. The weather was Bermuda perfect with clear skies and winds below 19 knots. In the third race, the wind was fairly steady at 11 knots while the boats flash by at an amazing 41.5 knots, a ratio of nearly 4 to 1. They were perfect race days for everyone except team Oracle USA who trailed the New Zealand Kiwis four to zero, officially shown as three to one, due to credit earned in the elimination races.

What were spectators thinking at the completion of the fourth race? There remained the possibility of optimism. In the 2013 previous race series in San Francisco, Oracle was down 8 to 1 against New Zealand and dominated the next eight races for a final winning score of 8 to 9.

Back in the Sargasso Sea and during a five-weekday break, Oracle made one publicized change by taking off a few pounds. The rules allowed for an unlimited number of weight changes up to 10% of the total. It was suggested that several hundred pounds had been left at the dock. But at what cost? Did they remove rigging, instruments, hydraulic gear? Were the Americans handicapped by what was removed?

In the next two racing days, New Zealand won with a final score of 7 to 1. Now the big question is, how did the Kiwis eat Oracle's lunch?

I will suggest some possible answers by combining speculation and a tidbit of inside information. No expertise is claimed, but the observations are vetted by personal experience with hydrofoils, aviation, racing, and 19 years of Mediterranean sailing.

First, the New Zealanders put more emphasis on reducing wind resistance, an important detail at speeds exceeding the island taxis. They used bicycle style rigs to exploit the leg strength of their Olympic class bicyclers. The NZ cyclists and the Oracle grinders provide hydraulic power to all systems including the main wing sail trim, wing shape, jib trim, rudder, and main foils -- commonly called dagger boards. The Kiwi's cycling allowed the entire 6-man team to better conceal themselves in the upwind hull. They did not sit up, hike-out, or otherwise extend their bodies outside the enclosure, a common practice used by sailors including the two Oracle team members seated most aft on the outer edge of the hull. By using leg-power, three cyclists could match the horsepower requiring four traditional arm-powered grinders. An early impression was that the pedalers were modeled in the fashion of high performances bicycle riders: big thighs, compact bodies. Perhaps like champion Lance Armstrong who bikes on land at 160 lbs. The American's team, who were in fact all from Australia except one from the UK, appeared to weigh more due to upper body proportions. In fact, here are two examples to demonstrate equality of the two teams. Grinder Kyle Langford weights 198 lbs, but

AC50 photo credit:
https://www.americascup.com/en/history.html

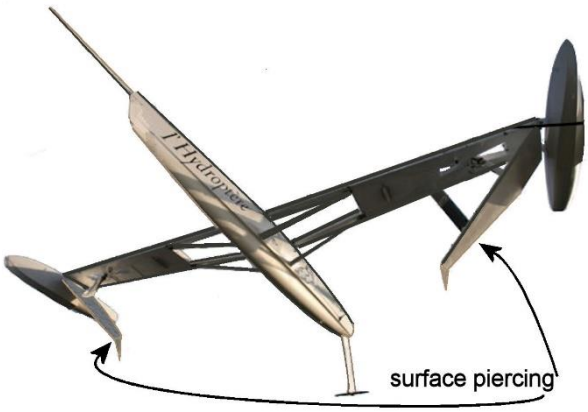
cyclist Simon Van Velthooven is 203 lbs. No weight saving here.

Here's a related advantage. Helmsman Peter Burling does not control pitch, but Oracle Helmsman Jimmy Spithill does. Cycling releases one New Zealander, Blair Tuke, from the muscle work, and he is then free to focus entirely on trimming the dagger board's angle of attack to maintain a smooth and constant pitch. This extremely important job can require several angle-of-attack adjustments each second. It's much better not to multi-tasking here. The result is less sailing energy lost in needless pitching and larger angle of incidence corrections. There is also a reduced risk of pitch poling, and less chance of losing at least 15 or 30 seconds or more by dropping the hulls onto the surface while tacking or jibing.

To illustrate how touchy this job is, consider my experience test flying human powered boats. Eight mph was the maximum speed anyone could control pitch manually while being distracted by physical exertion. The much longer, heavier AC boats would pitch slower, but would still require maximum concentration of the operator considering speeds possibly approaching 60 mph. Having a dedicated operator of the pitch control undoubtedly gave an edge to the Kiwis.

Perhaps a smaller gain was earned when the Kiwis eliminated the traditional mainsail sheet (rope) in favor of a streamlined, powerful, agile, stable, precise, hydraulic sail trimmer.

In addition, the Kiwis had a light wind advantage in their hydrofoil configuration. The winds at the start of second race were only 8.7 knots and Team NZ was correctly rigged with larger foils. It is also believed that the foil's thickness ratio (foil thickness/chord) was less than that of the Oracle's boat. The larger low-speed foils allowed the Kiwis to take off at lower speeds, and to remain foilborne more easily during tacking and jibing. The thinner foils may have allowed less drag and higher speeds at a given lower wind velocity.



L'hydroptere

During the race, two sets of foils were permitted to be interchanged. Also changes of less than 30% were allowed on each of the foils. Otherwise, to make new foils, lead time of three months and many thousands of dollars are needed.

Although both teams appeared to have their foils made of carbon fiber reinforced resin, some suspected the thinner Kiwi foils may have been composed of structural metal simply painted black to conceal the material. Although metal is heavier, it can provide superior strength and stiffness characteristics.

IHS member Tom Spear of team USA observes that, (Although) "Some exotic metals like beryllium or boron are prohibited by the rules, metals like steel or titanium could be used (if the) entire section were made of metal. If ETNZ used metal in their boards, it is more likely their boards bent more than OTUSA's, not less. Their thinner boards would have been less stiff, because stiffness varies with the fourth power of thickness, but still able to take the load."

This discussion is significant because one dagger board supports most of about three tons of displacement. With less distortion under load, the foils would perform more like predicted in the computer programs used, such as XFOIL, panel codes, and Navier Stokes CFD codes.

For example Tom goes on to explain, "When the boards bent they became more v-shaped and tilt the vertical lift to leeward. This required an increased side force from the shaft (AKA strut or vertical component) and this increases the drag. So OTUSA probably had less drag from the bending, at the expense of more drag from thickness".

Other conditions may be affected by the foil's thickness, for example, vibration, oscillation, surface proximity effects, and ventilation. Vibration and oscillation would be

nearly impossible to computer model and extremely difficult to measure, yet they would affect lift and drag resulting in wasted energy. Both teams used foils that are very much horizontal. When a hydrofoil rises to within 1.5 times the chord from the surface, the lift drops dramatically. Very near the surface, the lift can diminish to 60% of full lift. When the foil broaches the surface, lift virtually disappears as air surrounds the foil. This is called ventilation. These are just examples of how difficult it would be to closely predict foil performance under all conditions. So, luck is a factor in design.

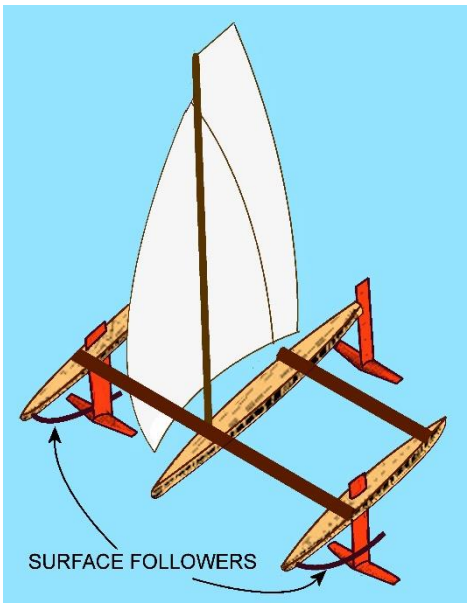
Tom adds: "The other thing you should know is the really dangerous loads were not the positive loads from flying the boat, but the negative loads from dropping the (dagger) boards. When the L shaped boards had positive loads, the compression of the top layers in the curved elbow resulted in the skins being squeezed onto the core, and the core was loaded in compression across the thickness of the core. But when the boards were given a negative angle of attack to drive them down in maneuvers, the negative lift on the wing resulted in tension in the top layers that wanted to pull the unidirectional planks off the core due to the curvature of the elbow. Several of the teams, OTUSA included, broke AC45 boards this way in testing & training."

Then there is the question of the two inverted "T" rudder/elevator foils. NBC Sports reports that former America's Cup skipper Paul Cayard believes Oracle's design team have done too little too late, altering the rudders to help hoist the boat higher when foiling. "They are now minimum size, and they were maximum size," said a bemused Cayard. "They've got 30 engineers from Airbus given to the team for three years and they didn't get the drag associated with the foils right." See what Tom Slingsby has to say about rudders on YouTube for, "Tommy Talks Rudder Wings."

Tom Speer responds, "There was a lot going on with modifications to the elevators that I can't talk about. Reducing the area was a visible change, but it wasn't the most significant change. The elevators did a lot more than just stabilize the boat in pitch, and Tom Slingsby talked about it some in the video he made about why the boats sailed with a bow-down attitude. How the elevators behaved is still proprietary but the changes actually made them more effective".

If anyone doubts the importance, danger, and trickiness of these aft components; view the YouTube video "Capsize – Emirates Team New Zealand pitchpole in America's Cup" of the Kiwis pitch poling when their elevators breach the surface:

Timing may have played a role. The kiwis came late to Bermuda. Their appearance was one and a half months prior to the beginning of the races. They had seen less of the competition than the other teams, but this allowed for earlier secret development at their distant island home. On the other hand, Oracle began practicing in Bermuda two years prior to the beginning of the races, making their secrets harder to keep; especially with camouflaged spies lurking in the bushes, as once reported.



Dr. Sam Bradfield's boat, Osprey

Furthermore, we may have witnessed the ironic advantage of the challenging team. During the Louis Vuitton qualifying races, the Kiwis fought 26 blood duels against seven hungry competitors. Oracle raced also, but on only six occasions. There is no substitute for the life or death struggles of these elimination heats. Perhaps this helps to explains why Jimmy Spithill, was thought by some to be less aggressive than his "Captain Hook" reputation might promise.

For example, in the first two days, helmsman Spithill allowed at least three un-forced penalties including crossing the starting line twice. Each was one or two seconds before the starting gun. These may have cost Oracle two races.

Final words about foil design, in the 2013 during the 34th AC Cup match OTUSA added foils to the AC72 hulls, and these were designed to foil entire downwind legs, but be sail hull-borne for the upwind legs. Compared to the *AC50*s of today, the foil's contributions were designed to be relatively small.

In the 35th AC Cup match the *AC50* catamarans were all designed by OTUSA. Also, the sails were virtually identical. All competitors used the hulls and sails, with the provision they were expected to design their own foils.

In 34th AC Cup match with their unique design, the Zealanders were the first to make long upwind flights and this made them winners for 7 consecutive races in 2013 prior to the Americans mastering their secrets. The next big advance was again made by New Zealand when they learned how to sustain flight throughout a tack (turning through the opposing wind) and a jibe (turning through the trailing wind).

Years ago, it was a troubling mystery to me why the AC72 boats and subsequent designs did not incorporate automatic pitch and height determining devices. These might have been patterned after the French *L'hydroptere* that used surface piercing front foils, or the *Dr. Sam Bradfield's* boat that used surface following wands linked to variable incidence front foils (or elevators). But then I was reminded of my past ideas for the NBA to lower the hoops (so I could make a basket) and for the MBL to make bigger balls (so I could hit one of the damned things), and like a bolt of light it came to me: it's a sport. They make it difficult on purpose!

Such irony that the Kiwis were the first to figure how to play around the rules.

HYDROFOIL NEWS

SeaBubble: Hydrofoil Venture

The engineers and sportsmen behind L'hydroptere are seeking to, "open waterways for everybody, all around the world, by creating a new way to move people on waterways at car speed, for the price of a regular cab, with no impact on the environment nor on the cities' infrastructure." Their concept, SeaBubble, is electric, autonomous, and flies on foils at 12 km/h. Visit their website for more.

Carton Ondule Foil

The surface-piercing "Carton Ondule" foil was featured in a *Classic Fast Ferries* Short Item published in October 2016 by Tim Timoleon. Designer Hans Jorgen Hanson has also uploaded videos on YouTube of model tests performed for the fast ferries.

IHS NEWS

Joint Dinner Meeting with SD-5 High-Speed Planing Craft

Prof. Stefano Brizzolara, PhD
Virginia Tech, Blacksburg, VA

Dr. Brizzolara calls planing hulls "the emblematic category of high speed marine craft." He started by reviewing the most significant planing hull designs of the past and their famous designers, in Europe and the USA, such as Renato Levi, Peter du Caine, Pietro Baglietto, Eugene Clement, Donald Blount, Ray Hunt; and their builders such as Riva, Pershing, FB Design, Wally and Overmarine. He then explained their hydrodynamics and how they have integrated hull and propulsion. Next, he touched on aspects of styling, especially for yachts, and showed that few important innovations have come in recent decades. He then presented new ideas and concepts that appear to offer dramatic performance improvement. One of those, the Stepped Cambered Planing Hull with Hydrofoils (SCPH2), has shown drag reduction of more than 30 percent in model scale tests, compared with present designs.

PT.50 Freccia delle Isole laid up in Messina in 1992
Photo credit: Tim Timoleon, Classic Fast Ferries

Stefano Brizzolara is an Associate Professor in ocean vehicle dynamics in the Aerospace and Ocean Engineering Department at Virginia Tech, as well as a research scientist at MIT, where he founded the Innovative Ship Design Lab, iShip. As a Naval Architect and Marine Engineer with a PhD in numerical hydrodynamics for ship design, he gained a solid high-tech ship design experience in the Navy Shipbuilding Division of Fincantieri, in Genoa, Italy. He developed numerical methods for high-efficiency low-noise propeller design and unconventional high-speed hull form design and optimization that have led to several innovative hull forms and marine propulsor technologies. He is the author of more than 150 scientific papers and inventor of six patents (two pending). He presented at the Army Navy Country Club in Arlington, VA on February 2017.

Model Test of Stepped Cambered Planing Hull with Hydrofoils (SCPH2)

IHS New Projects

IHS has embarked on a wide range of initiatives aimed at increasing awareness of hydrofoil and hydrofoil related technology developments around the world.

We are fortunate to have a Board of Directors that has devoted much time and effort over many years in moving these initiatives forward. The best way for you to support the Society and become a future Board member is to pitch in and become involved. Initiatives include contributing to the Newsletter, promoting the Mandles Prize and judging its entries, improving the website and its content, member outreach, identifying speakers for dinner meetings, and collecting photos and videos for Facebook and SmugMug.

Many of these activities can be done at home over the internet or phone and can be at any level of engagement that you are willing and able to provide. We urge all of you to consider where you might help in furthering these efforts. Please contact Ray Vellinga (email) or Mark Bebar (email) if you're interested. There is much to do and your active participation is critical to a successful future for the International Hydrofoil Society.

Mandles Prize for Hydrofoil Excellence

The International Hydrofoil Society has collected eight entries in its 4th year hosting this Prize thanks to the generosity of Mr. Martinn Mandles, a long-time member of IHS and his wife Connie. IHS will once again sponsor the Mandles Prize for Hydrofoil Excellence competition next year with applications due in May 1, 2018. Students and faculty, now is the time to start thinking about entering. The competition, includes a $2,500 First Prize and up to two $1,000 Honorable Mention awards. The announcement and rules for 2018 will be posted on foils.org by October 2017.

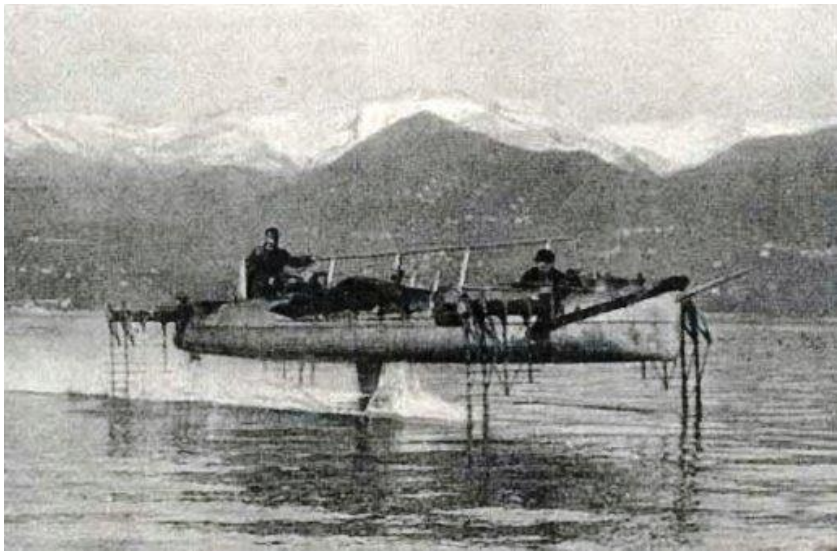
In order to open the competition to a wider spectrum of qualified entries, submissions by students based on work completed since 2013 will be eligible for the Mandles Prize. This is an outstanding opportunity for the next generation of hydrofoil developers to be acknowledged for their efforts to advance the state of the art in hydrofoil and hydrofoil-assisted craft engineering, design and construction. Background on the Mandles Prize and Rules for the competition can be downloaded from the IHS website. (www.foils.org)

Based on the 2017 entries and award winners, we anticipate a very exciting competition and look forward to receiving many high-quality entries. Questions on the Mandles Prize can be e-mailed to Ray Vellinga (email) or Mark Bebar (email) if you're interested.

FROM THE ARCHIVE: THE SPEEDIEST BOAT

Charles Pieroth supplied a copy of the September, 1911 National Geographic Magazine which contained the following article:

Through the courtesy of Dr. Alexander Graham Bell and Mr. F.W. Baldwin, the National Geographic Magazine publishes information of perhaps the most unusual craft afloat, the hydroplane boat of Mr. Forlanini. In this motorboat Dr. Bell recently traveled 45 miles an hour on Lake Maggiore, Italy. The new Italian hydroplane is described by its inventor, Enrico Forlanini, of Milan, as follows:



Forlanini hydroplane – Lake Maggiore, 1910
commons.wikipdia.org

"The apparatus has been patented under the name of appareccio idrovolante- (apparatus for hydroplaning). It constitutes true hydraulic flight, the apparatus being sustained by the water in the same manner that birds and aeroplanes are sustained in the air; that is to say, by the dynamic reaction of the water on the superfices or planes attached to the hull of the hydroplanes, most of these planes remaining completely out of the water while the machine is in action.

'The idea of using the dynamic reaction of the water is not new, but up to the present has not been applied with success except what has been attempted with gliding boats. In these boats, however, the hull does not leave the water, but skims on the surface, which hinders the attainment of really high speeds.

"The most important characteristic of the hydroplane is that the resistance of the water is not dependent on the speed, but remains constant, and is equal to half the total weight of the apparatus; the total resistance is increased only by a portion of resistance due to the air, a portion naturally proportional to the square of the speed. In consequence, similar hydroplanes in the future should be able to attain speeds of 60 to 100 miles an hour and change themselves into flying machines by the addition of the necessary planes for aerial suspension."

After six years of experimenting, Forlanini can now consider that he has arrived at fully satisfactory and definite results, says the Scientific American. The rust hydroplane he tried, during the years 1905 and 1907. immediately demonstrated the excellence of the new system, but its performances were always handicapped by the irregular working of a bad 70- horsepower motor with which it was fitted. Another hydroplane, tried during the years 1908 and 1909, was fitted with a steam motor that worked more regularly.

Although the effective power was only 25 horsepower and the weight of the boat over a ton, this machine attained a speed of over 50 kilometers an hour.

The hydroplane that is being tested at present weighs two tons when there are two persons aboard -- it is possible to carry four other persons -- and it is fitted with a 100-horsepower gasolene (sic) motor. It has attained a speed of 45 miles an hour, and this speed will be increased by the introduction of a few modifications that are being gradually indicated during the trials it is now undergoing. This hydroplane has a hull 32.8 feet long; at the bows and stern are two strong steel tubes transversely. At the four free ends of these tubes --namely, on the starboard and port sides of the boat --is fixed a sort of framework, which contains a series of planes, one above the other. These superfices of planes are made of

high-resistance steel, the workmanship being very accurate, and their size decreases from the top to the bottom.

When the hydroplane is not working, but is floating on the water like any other ordinary boat, the planes are immersed in the water, and have a slight horizontal inclination. As soon as the hydroplane, owing to the working of the screw, begins to move forward, the water exercises a vertical force on the planes in precisely the same manner as the air on the planes of an aeroplane. The hull therefore tends to rise and so diminish its immersion and, naturally, the resistance against its motion in a manner that the speed is able to increase.

In this way, there comes a moment when the hull is completely out of the water. At this point the speed rapidly increases, and little by little the various planes or superfices rise out of the water one after the other. When the maximum speed is reached only the bottom planes remain on the water, while the bottom of the hull is 65 centimeters higher

The propeller by which this strange craft is driven is carried on a hollow tin, which may be seen amidships, the short propeller shaft being revolved by bevel gears attached to a vertical intermediate shaft, driven direct off the motor.

IN MEMORY OF

George “Dick” Follis

Seattle native, George “Dick” Follis passed away February 15, 2017. “Dick worked on the FRESH-1 and I believe the Tucumcari. I know he worked on FRESH-1 as an EE. Dick and I spent a good 24 hours trying to salvage the electrical/ electronics by washing down and blow drying the equipment after getting the salt water bath.” - Sumi Arima

Obituary – Dignity Memorial

Seattle Times Article

Michael R. Terry
CDR USN (ret)
By Mark Bebar

It is with great sadness that I report the passing of Michael R. Terry, CDR, USN (ret) on March 11th, 2017. I was fortunate to work directly with Mike in the late 1970s during his assignment in the PHM Acquisition Program Office (PMS 303). It was during this time (OPEVAL) that PHM-1, USS PEGASUS , experienced significant technical issues in key ship systems. This resulted in an intense engineering effort by in-house Navy and Boeing Marine Systems engineers to correct the deficiencies and include corrections in the shipbuilding specifications for PHM-3 Series production ships. Mike was the technical lead for the Navy in addressing these issues and ensuring a high level of PHM class reliability and performance. He was a consummate professional, wonderful to work with, and will be sorely missed by all of us in the hydrofoil technical community.

IHS WEB CONTENT

Check it out (click on link):
http://foils.org/
SmugMug
Facebook Page
YouTube Channel

OUR ASSOCIATE, THE FOILING WEEK. SEE THIS VIDEO:
http://www.foilingweek.com/

THE NEXT ISSUE

Remember, if you enjoyed reading articles in this issue of the Newsletter, they were provided with thanks to fellow IHS members. If you are able to share news on new projects or research work and, better still, prepare an article for the Newsletter, please email: editor@foils.org