Foiled Again

A HYDROFOIL EXTRAVAGANZA FROM GRAHAM TAYLOR.

During the last few years that I have been mucking about with hydrofoils, I have gathered together a number of photos which I thought would be nice to share with those of you interested in the more experimental side of the hobby. Although the hydrofoil still seems to be a novel idea, they have in fact been around for donkeys years. Since around 1905 to be more accurate, when an Italian, Enrico Foranini, demonstrated his craft on Lake Maggiore. It is a little known fact that a hydrofoil, “Hydrodome IV”,

Water-ski airboat. Don’t confuse hydrofoils with water-skis, they are quite different! Shown here is an experimental water-ski airboat by the author.

Monte Gargano. Rodriguez RHS200. The classic surface piercing vee foil system can be seen on this Rodriguez RHS200. An ideal scale model subject (photo by Adriatica Ferries, Italy).
Westfoil 25m. Yes it really does have two huge ducted fans for foil borne propulsion! A similar concept to the Boeing Jetfoil, the Westfoil 25m avoids the problem of how to get power to the water below. It is also equipped with surface propellers for hull borne operation and take-off driven from the same engines. (Photo by Westfoil, USA, designed for Alexander Graham Bell (of telephone fame) and piloted by Casey Baldwin, took the world water speed record in 1919 with an astonishing speed of just over 70 mph!)

A great deal of hydrofoil development work was undertaken in Germany by Baron Hanms Von Schertel prior to, and during, the Second World War. His ideas were further developed during the 1950’s and 1960’s by naval architects around the world in search of practical seagoing craft and who had grandiose ideas about ocean-going hydrofoil battleships. Out of all this came the two hydrofoil systems, the inherently stable “Surface Piercing” system and the fly-by-wire computer controlled “Fully Submerged” system. The research lead to construction of experimental vessels such as the Canadian 200 ton FHE 400, the Grumman built 80 ton ‘HS Denison’, and the awesome 320 ton ‘Plainview’ which was designed to exceed 70 knots.

Nows The Time.

Now is a very exciting time to look at craft like the hydrofoil. Only in the last decade have naval architects and designers had the courage to shrug off conventional thinking about what a boat should look like (the monohull — sharp at the front and blunt at the back) and to propose viable alternatives. This has resulted in a reappraisal

Below, Jetfoil model. Martin Seymours glow-plug powered model of the Boeing Jetfoil, has fully submerged foils and working waterjet propulsion, photo courtesy of Hydrafibre.

Above, Kometa Model. Werner Horemans near scale model of the Russian Kometa class passenger hydrofoils. It weighs 13kg and is powered by two Barracuda 24 volt one horsepower motors. The model is based on moldings for an unsuccessful kit by Sideria Models, Italy.
of existing technology and an explosion of new and adventurous ideas. Nowadays anything goes, with a diverse range of high speed catamarans, hovercraft and wave-piercing ideas on offer.

I should at this stage point out that for the hydrofoil a speed barrier exists which is as real as the sound barrier was for aircraft; I call it the “cavitation barrier”. This is the speed beyond which the low pressure over the top surface of the foil drops so low as to cause cavitation, which breaks down the lift. At this point conventional foils lose about two-thirds of their lift, which causes the craft to sink back to the surface. The cavitation barrier occurs at around 70 mph, as Mr Frank Manning-Lee found out during his attempts to set a water speed record in 1951 with a jet powered hydrofoil boat on Lake Windermere. Much research has taken place into supercavitating foil design, but a practical solution has yet to be found that will satisfy both the dynamic and structural requirements of a seagoing craft, which is why you don’t see higher speed hydrofoils today.

What’s New?

So what’s new in hydrofoils? Well, the latest idea is the Foilcat passenger ferry built by Westamarin West a.s., a Norwegian ship builder. Launched in early 1992, this vessel combines the qualities of a high speed catamaran with a fully submerged hydrofoil and signifies the start of a new direction and a new generation of hydrofoil craft. Unlike previous hydrofoil craft, the Foilcat does not aim to go “foil borne” as soon as it leaves the quay-side, but instead builds up speed as a “foil-assisted catamaran” until it takes off completely at around 30 knots. Full speed is just over 50 knots. Even at this speed the twin hulls barely clear the water. To a certain extent they are “wave piercing”. So, you see the Foilcat combines a number of different ideas to give good sea keeping and high speed performance.

The Foilcat is not the only vessel to combine hydrofoils with other hull forms. Others include:
• the Rodriguez ‘Foil Assisted Monohull’, which has a split computer activated surface piercing rear foil to control roll and trim.
• the Eco luxury high speed yacht built by Blohm & Voss, which has a foil under the stern to improve low speed efficiency and act as a trim tab.
• the T-Craft International T2212, which is an impressive looking catamaran patrol boat with foils slung between the hulls.

Milestones.

Renato “Sonny” Levi has been at the forefront of powerboat design for many years and is one of the world’s leading designers. His immense contribution to powerboat technology has included “delta” configuration deep vee hulls, surface
drive propulsion for offshore powerboats and the Levi step drive system. His imaginative designs include such craft as Surfury and Atlantic Challenger 11.

"Milestones in my Designs", a new book, charts Renato Levi’s life, ideas and designs to the present day in an easy to read non-technical style. The lavishly illustrated 260 pages are packed with line drawings and hundreds of photographs which show the development of each concept. The book also includes colour fold-out cutaway drawings of some of Levi’s milestones, Surfury the extraordinary Dart and Arcidiacono craft and of course, Virgin Atlantic Challenger 11.

There are also technical appendices on planing craft design, flaps and surface propellers.

Having earned a reputation for innovation, pushing at the boundaries of convention with ideas such as "ram" wave piercing powerboats, he is not afraid to discuss these ideas or where necessary his failures, alongside his successes. This book is therefore an excellent insight into the thoughts of a legendary designer who has been responsible for so much of the leading edge of powerboat technology.

The book is not cheap, at about £100, and at the time of writing is not distributed in the UK. It is published, in English, by Kaos Service Srl, Via Pontaccio 10, 21121 Milano, Italy, telephone number Milan 284189.

So what does all this mean to the modeller? Well, now that the full size world seems to have thrown away convention, wouldn’t it be nice to see some more radical models too? Of course, we have already started down this path with the new technology of RC hydroplanes, the fast “cats” and the surface piercing propellers. Interestingly, model speeds are quickly approaching the limits of knowledge and research of the full size world. So your ideas for the local pond could one day become seagoing reality!

Go on — build something radical!