7
JULI
2002

# VI BÅTÄGARE

## CIGARETTE: BACK ON TRACK

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**NY DIESEL ETTA?**
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## BOTTENREVOLUTION?

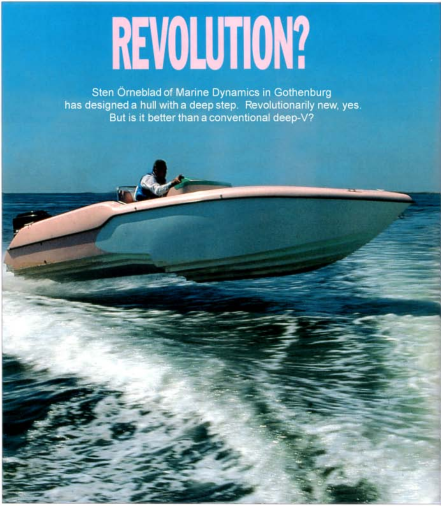
TESTER
- RYDS 23 – Klassresan
- MAREX 270 – Ansiktslyftet
- BMB 270 – Experimentet
- OMVÄRDERAD: – JODA 8100 TC sid 60

TIDSAM 0792-07

staffan westerling

# REVOLUTION?

Sten Örneblad of Marine Dynamics in Gothenburg has designed a hull with a deep step. Revolutionarily new, yes. But is it better than a conventional deep-V?



**In 1960** American Richard Bertram built the first hull with a deep V bottom (24°), designed by C. Raymond Hunt (a Bertram 31 named "Brave Moppie").

It was revolutionary news that spread quickly. Almost all modern, planing boats have a more or less deep-V ("deep-V" should have an angle greater than 18°).

What has happened since then?

Not much.

Boat manufacturers have worked with the placement, size and length of the strakes, as well as with the V bottom. Air-lubricated steps to reduce friction have become popular in the USA, but this is nothing new. They were designed for sea airplanes in the middle of the 1910s and were used frequently in wooden boats many years ago.

Dynalift from Marine Dynamics in Gothenburg is definitely a new design. It has a deep step athwart the bottom just aft of midships. It looks as if two hulls with different characteristics have been joined.

The designer, Sten Örneblad of Marine Dynamics in Gothenburg, has been experimenting with hull designs for many years and he believes he has found the right one. It works for all sizes of planing hulls, from model boat size up to a 30-meter landing craft.

*Here is the secret of Dynalift. A deep step that divides the boat in two. Sten has approved all photos. We were not allowed to publish the most decisive details because the patent has not yet been granted.*

FACTS

| Boat | Dynalift | Trad.V-bottom |
|---|---|---|
| Length | 6,3 m | 6,2 m |
| Beam | 2,4 m | 2,38 m |
| Weight (w/o motor) | 700 kg | 650 kg |
| Freeboard | 0,8 m | 0,8 m |
| V-bottom | 18° | 18° |
| Material | Fiber-glass | Fiber-glass |

Company/Designer: Marine Dynamics, Sten Örneblad, Phone: +46(0)709-413 713

For business reasons, Sten does not want to reveal the details of his construction.

In any event, here is a short description of the hull concept in Sten Örneblad's own words:

"The new hydrodynamic aspect of the design is a combination of the following factors:

- Approximately 50% lower friction as compared with a traditional hull and about 35% less than for a ventilated hull.

- Significantly less induced drag. Induced drag is caused by the tip vortices where the water pressure leaks out and it is the greatest drag factor on a planing hull

- Higher dynamic lift allows the hull to better bear loads when planing.

- A constant balance between the center of gravity and the center of lift allows the hull to avoid porpoising.

- Dynalift builds on the hydroplane concept. The hull is divided into two planing surfaces to achieve a more advantageous lateral relationship between the planing surfaces; in other words, the surfaces on which the hull rides are shorter and wider. Because of the height of the step one can determine the angle of attack of the hull relative to the water surface without the bow flying up. An additional spin-off effect is that the hull has an insignificant planing threshold because the planing pressure in the aft and forward planes is developed simultaneously.

- It is the V-bottom angle that determines which angle of attack the hull should have to achieve the least drag and greatest lift.

- There is an optimal relationship between the V-bottom angle and the hull's angle of attack. This relationship is one of the claims in the American patent application."

## FROM THEORY TO PRACTICE

We have compared the Dynalift hull with a conventional, deep V-bottom hull. The boats have the same bottom angle and are essentially equally long. There is only a two-centimeter difference in beam. The Dynalift boat weighs 50 kg more than the conventional V-bottom.

Both boats are equipped with a 2-liter, 135 HP Mercury outboard. The conventional boat is to remain anonymous since we are comparing principles, not boat models.

THE TEST CONSISTS OF THREE PARTS: speed, fuel consumption and acceleration with a two-person load.

To make the test values as fair as possible, both boats were driven during a single day. The speed tests were made using DGPS. Fuel consumption was measured with a flow meter and acceleration was measured with a stop watch.

The tests were carried out in Varberg, Sweden.

## SPEED

The Dynalift hull is a little more than 7 knots faster at the top end compared with the traditional V-bottom hull: 47 kts vs. 40 kts. The Dynalift hull has a greater top speed down to 2200 r.p.m. or about 25 kts. After that, the traditional hull takes charge and is faster at the other measured r.p.m.s

In part the big speed difference depends on the Dynalift hull having a high-performance steel propeller. A standard aluminum propeller is mounted on the traditional hull.

A steel propeller has generally 1 - 2 knots speed advantage above 40 kts (with the motor raised by the existing amount) whereas it has somewhat worse propulsion characteristics at lower speeds.

The graphs confirm this.

If we calculate an average speed over all r.p.m.s with a two-person load we get the following:
*Dynalift hull 28.1 kts*
*Traditional V-bottom hull 27.1 kts*

## FUEL CONSUMPTION

The Dynalift hull is also clearly more fuel-efficient than the traditional hull. At 40 kts the difference is a whole 7.6dl/nm [deciliter/nautical mile] and at 30 kts the difference is 3.9 dl/nm. At 20 kts the difference is less and comes to 0.6 dl/nm to the Dynalift hull's advantage.

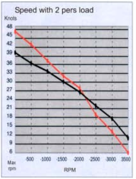
The traditional hull is this much "thirstier" (l/nm) with a two-person load:
At 15 kts the traditional V-bottom is 24% thirstier

| | |
|---|---|
| *At 20 kts* | *+6% thirstier* |
| *At 25 kts* | *+29% thirstier* |
| *At 30 kts* | *+41% thirstier* |
| *At 35 kts* | *+47% thirstier* |
| *At 40 kts* | *+60% thirstier* |

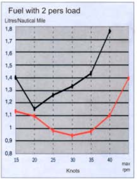
An average fuel consumption value for the specified speeds (15, 20, 25, 30, 35, 40 knots) with a two-person load is:
*Dynalift hull 1.03 l/nm*
*Traditional V-bottom hull 1.39 l/nm*

The traditional V-bottom hull is 0.36 l/nm, or 35%, thirstier, on average, taken over all the specified speeds.

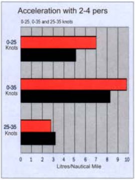
What does the fuel cost then work out to be, assuming average fuel consumption, if we drive 1000 nm per year? The price of fuel at a standard marine fuel station is, today, SEK 10.15/liter (95 octanes):
*Dynalift hull SEK 10455 (two-stroke oil additional)*
*Traditional V-bottom hull SEK 14109 (two-stroke oil additional)*




*The Dynalift hull is seven knots faster at top than the traditional V-bottom hull. 47 knots compared to 40 knots. The Dynalift hull is fastest at top, down to about 2200 rpm or about 25 knots. After that, the traditional V-bottom hull takes over and is, as you can see, faster at all the other measured RPM.*




*The Dynalift hull also has a lot better mileage than the traditional V-bottom. At 40 knots the difference is as much as 7.6 dl/nautical mile and at 30 knots the difference is 3.9 dl/nautical mile. At 20 knots the difference has decreased and stays at 0.6 dl/nautical mile to the advantage of the Dynalift hull.*




*The traditional V-bottom is slightly faster in acceleration than the Dynalift hull can perform. Although it just differs a few seconds from 0-20 knots, and just a second from 0-30 knots.*

= DYNALIFT HULL
= TRADITIONAL V-BOTTOM HULL

In a year the difference is SEK 3654 to the advantage of the Dynalift hull.

## ACCELERATION

Over the acceleration ranges 0-25 knots and 0-35 knots the traditional hull is a couple seconds quicker. Between 25-35 knots it's a dead heat.

In the forward step, the Dynalift boat is equipped with a 200 liter water tank of the Fjordling type. This gives better steering properties at displacement speed especially in hard wind. As all will realize, these extra kilograms are a burden in the acceleration test.

## RIDE PROPERTIES

During the test ride I sit in the passenger seat and observe all that happens.

We glide out from the dock calmly and peacefully. It is blowing between 5-10 meters/second, a little off the bow. The Dynalift hull goes forward straight as an arrow, helped by the filled forward water tank. At 5 knots the water is drained out and after 7 seconds the tank is empty. Sten puts on the gas up to planing speed with absolutely no tendency of the bow rise. The planing threshold is almost non-existent. Having full view forward at these low speeds is a unique experience. At about 15 knots "First Lady," which Sten has chosen to name his creation, rides flat as a pancake but, at the same time, light on the water, with no significant wake. At the same speed, the traditional hull raises the bow towards the heavens, with a rear wake that is clearly greater.

Between 15-30 knots the Dynalift hull rides very smoothly and is essentially unaffected by load, regardless of where we are in the boat. The trim plane for this vessel is just a memory. The design manages to balance wholly on its own.

The Dynalift hull also has good ride characteristics up to about 40 knots. We pass over the waves and wakes of other boats in all directions with no problems whatsoever. It feels thoroughly secure.

On the way back to home port, with the "pedal to the metal", Sten suddenly screams: "Let's turn to starboard!"

"Sure," I think, "YOU do it."

And Sten does. 180° at 47 knots! Had it been a traditional V-bottom boat we would have immediately pitched over sideways, that is, "rolled," as we say in racing parlance. Instead, the Dynalift hull reacts by pulling itself around without significant lateral digging in. Just like a hydroracer in a "racing 250" or "racing 500" that rounds a buoy on the race course. But completely without drama. A test driver has to experience a lot before his helmet flies off from surprise.

## CONCLUSION

The Dynalift hull feels secure, very pleasant, and different to drive. My thoughts go back to the beginning of the 80s when I competed in power catamarans. The similarity is mostly the feeling of being able to ride on top of the water instead of through it, but, unlike in a competition catamaran, without risking safety.

Easily driven, stable, fast and very fuel efficient is how I summarize the test ride in First Lady.

It will be very interesting to follow Sten Örneblad and Sven-Åke Johnsson of Marine Dynamics in their continued work towards their goal. According to Sten this is, first of all, to find an American licensee or purchaser of the concept. The back-up plan is to manufacture the hull themselves or through cooperation with a large manufacturer. As of now, Marine Dynamics has made some important contacts, but as yet nothing is firm.

The project has quite clearly great potential. Boats that are stabile and easily driven as well as fuel efficient are advantageous both for consumers and the environment. One can only hope that manufacturers have the same opinion. When all is said and done it still comes down to one thing: money. ▶

### FACTS

| | | |
|---|---|---|
| Motors | **MerCury 135** | **MerCury 135** |
| Motor type | 2-stroke/V6/60° | 2-stroke/V6/60° |
| Fuel system | Carburetor | Carburetor |
| Electric ignition | Yes | Yes |
| Weight | 189 kg | 189 kg |
| Cylinder volume | 1998 cc | 1998 cc |
| Diameter x stroke length | 79 x 67 mm | 79 x 67 mm |
| Power at propeller | 135 HP (101 kW) | 135 HP (101 kW) |
| Full-power range | 5000-5600 | 5000-5600 |
| Ignition system | CD-ignition | CD-ignition |
| Gear reduction, transmission | 2.0:1 | 2.0:1 |
| Model year | 1986 | 2001 |
| Power trim | Yes | Yes |
| General agent | Marine Power Sweden, Inc. www.marinepower.com | Marine Power Sweden, Inc. www.marinepower.com |

### MISCELLANEOUS

| | | |
|---|---|---|
| Total weight (boat + motor) | 890 kg | 840 kg |
| Test load | 2 persons | 2 persons |
| Test propeller | 21" Laser (steel) | Standard 19" (aluminum) |
| Elevation at transom | 32 mm | 25 mm |
| Max. test r.p.m.s (2 persons) | 5700 | 5800 |

# BACKGROUND

Sten Örneblad, from Partille in Gothenburg, founder of Marine Dynamics and designer of the Dynalift hull, is a very energetic man with a burning interest in hydro- and aerodynamic properties when it comes to moving boats on the water.

Sten is hardly a neophyte in the boat business.

At the end of the 60s Sten had a summer job at the Monark Crescent boatworks in Varberg, where he developed an interest in boats and learned the basics of boat-building. It was also here that the idea for his first windsurfboard was born after a visit to the USA in 1972. Windsurfing began to grow rapidly over there, whereas the interest had not yet taken off in Sweden.

Sten saw his chance to get in early.

An old barn in Trönningenäs had to serve as the boatworks for Sten's first experiment.

The board, which he christened "Sail Surfer," and later "Arrow" and "Rocker," was sold mostly to friends and acquaintances and at the same time helped finance Sten's studies in nautical hydrodynamics, aerodynamics, and flow theory at Chalmers in Gothenburg and the University of Bristol.

As one of the first in Sweden, Sten had as his goal not only to manufacture just any old windsurfboard but rather the fastest one of them all. Said and done. The board became a success not only in Sweden but also in the USA.

Sten spent 1979-84 in the USA to market and improve his product.

Results were not long in coming. The American company Meritex, from California, bought the design and named the board "Meritex."

In the beginning of the 1980s Sten's design racked up victories in American competitions. Meritex won both the lightweight and heavyweight divisions in the North American Championships in 1981, as well as other competitions.

When Sten returned home to Sweden after his string of victories in the USA, he was ready to take on something new.

Sten began to work on a 15-foot sailing catamaran that he named "Cat-Rocker." During his years in the USA he had also found time to study catamarans together with NACRA -- North American Catamaran Race Association. There he had hit upon several solutions to problems that catamarans suffered from. Among other things, he solved the problem of so-called "pitch-poling," or, in Swedish, a flip in the longitudinal direction. With fresh theories in his back pocket, Sten designed more stable hulls with rounded decks, straight sterns, and with greater buoyancy than before. These made his model boats sail faster and more securely; at the same time they also used the power of the wind better thanks to a new, rotatable mast shaped like an airplane wing, which Sten himself had developed from American ideas.

Asymmetric hulls instead of a centerboard, as well as a "floating" mast, were other solutions that Sten applied to the Cat-Rocker.

Sten worked on this catamaran project until 1990.

In 1990, Sten was given an assignment by Cremo to design an efficient bottom for the new Crescent 590 Celest and Duo. By my standards, the result was a seaworthy and stable hull, which, by the way, was drafted by Pelle Pettersson. In 1993, Marine Dynamics got an order from the Estonian Border Guard for six bullet-proof patrol boats. The boats were to be used to hunt Russian smugglers on the Narva River. One boat was delivered but the remaining five were stopped because a permit was cancelled.

*Sten Örneblad holding a model of the Dynalift hull. It was launched in 1997. A few thousand hours later the full-scale model is ready to be launched. Now begins the hunt for boatyards who are willing to back the idea.*

In 1996, Marine Dynamics, with Sten as the source of ideas and Sven-Åke Johnsson as *engineer, began to work on bottom designs for motorboats. Dynalift was born.*

The first test 1:5 scale model was launched in 1997.

In 2000, after some 6000 hours of hard work in the form of research, testing, and building, as well as an additional 2000 hours of marketing, the boat was ready.

The costs for the project, not counting their work, is today up to about SEK 500,000.

Up to this year and from now on Sten, together with his project companion Sven-Åke Johnsson, will to large extent focus on selling Dynalift to manufacturers around the world. ▲