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THE CONCEPT OF CATRI FOILERS

Catri Foilers are not meant only for hydrofoil enthusiasts. The use of this recently patented hydrofoil system opens a new level of high-speed sailing to any contemporary amateur sailor. It is applicable to a wide range of vessels, from small day-sailers and micro-cruisers to 60-foot offshore racing "machines" in all weather conditions.

Why hydrofoils?

Even though a sail-boat does not easily associate with speed records, the modern wing-like sails are very effective at high speed. The real capacity of sails potential increases rapidly with the speed rate. The greater the speed, the greater the real sails potential. The hydrofoil can also be very effective at high speed. As compared to the popular "gliding" principle (glider), it allows to reduce water resistance by three times.

A combination of sails and hydrofoil is therefore very effective – both scientists and designers agree that the future of the "speed sailboat" is after the hydrofoil.

What is the problem?

A greater speed of a sailboat can only be achieved by ensuring a higher level of stability, which cannot be guaranteed by traditional types of boats. Multihulls offer a solution to this problem.

The problem of a hydrofoil sailboat stability is even more complicated. Up till now technical solutions have been found only for still water and uniform wind conditions. Under these conditions the speed of a hydrofoil sailboat exceeds 40 knt (74 km/h). Still, to this moment no appropriate hydrofoil sailboat has been developed for open sea and real weather conditions. Catri Foilers offer the first feasible solution to this problem.

Why Latvia?

The French have been more active than others in the field of sail-hydrofoil research. Very expensive hydrofoil projects take place regularly in France. Still, up till now they have not been able to win in any significant competitions. Similar attempts have been made in Great Britain and the US, but also there no real practical solutions have been achieved.

On the other hand, despite years of isolation from the international community, Latvia has made use of a number of stimulating factors,-- namely, the results of Russian research in the field of hydrofoil application. A group of talented students in Riga started yachting-research as a hobby, but understood soon enough, that their only hope to compete with the outer world was attempting to break the speed records. The theoretical basis of "sail-hydrofoil" combination was worked out, and Latvia chose for an unconventional angle of research. Which turned out successful.

The Latvian solution

If we compare a hydrofoil with an arrow, it is remarkable that up till now attempts have been made to stabilize it by attaching the regulating mechanism (feathers) at the wrong end!

All patents, issued in this field in the last years, have to do with *moving* hydrofoil stabilization mechanisms, whereas the Catri Foiler solution simply attaches the “feather” at the end of the “arrow”, thus making all kinds of regulating mechanisms irrelevant. Tests have been carried out in order to control the working and interaction of sails, hydrofoil and wind, and an optimal solution has been found.

LATVIAN MULTIHULLS

Riga, the capital of Latvia, has always been the center of multihull innovation in the former USSR. The cruising & racing catamarans under the name of "Centaurus" are well known in the largest yachting clubs in Russia and elsewhere, and are usually the greatest winners in offshore races. The new calculation methods and original construction solutions of Latvian makers allow to increase the speed and safety of multihulls, improving the comfort and cutting the construction costs at the same time. The knowledge accumulated behind the Iron Curtain has now become available to the outer world.

Latvian multihulls: A Brief history

- 1959. A group of enthusiasts from the Riga Technical University builds a yacht with two connected hulls, not being aware of the fact that similar yachts are built somewhere else and that they are called 'catamarans'. L=5.5 m; B=2.6 m; S=18 sq.m.
- 1961. The third catamaran, built in Riga, achieves a considerable speed and becomes very popular. In all winds it passes the fastest yachts and pulls a water-skier without any problems. L=6.5 m; B=3.6 m; S=30 sq.m.
- 1964. "B" class catamarans are included in the official programme of the USSR competitions, where Latvian catamarans are main competitors for the prize.
- 1969. The first cruising catamaran is built. This catamaran makes the longest distance in the season and wins all races. L=9.3 m; B=5 m; S=60 sq.m.
- 1970. A shipyard is established in the collective fishing farm Carnikava nearby Riga. The production of cruising catamarans for sale is started. The first (and the last) CAO-size cruising multihull is built.
- 1971 -1972. The problems of offshore multihull stability and safety are investigated: the optimal length and breadth ratio and safety reserve at large *sive (?)* heeling are

- determined; at the same time a device for an automatic release of sails at dangerous heeling is developed.
1973. The largest USSR offshore race in the Baltic Sea is held with course length of 1100 n.miles; about a 100 offshore yachts take part. The Latvian catamarans finish as first in all legs of the race. A similar result is reached in all the following years.
 1976. An unsuccessful attempt to acquire a permission to participate in OSTAR (Single Handed Trans Atlantic) race. For this purpose a special catamaran Centaurus 44 is built. L=13.3 m; B=8.1 m; S=140 sq.m. In a speed test this catamaran reaches 24.9 knots and wins the title of the fastest yacht in the USSR for many years to come. All attempts to obtain permission to participate in races abroad are unsuccessful.
 1982. A special prototype hydrofoil for speed records is developed and built in order to compete with multihulls abroad. The speed of 27 knt is registered in a lake near Riga, which exceeded all the records of the limited class and appeared to be the second best speed in the world, after the absolute record and the best speed for hydrofoils. The begin of investigation for a broader application of hydrofoil in sailing.
 - 1984 - 1985. Permission from Moscow to organize export of catamarans built in Riga. Catamarans Centaurus 38 are exhibited in Hamburg and Genoa. The Latvian catamaran-builders and sailing teams are not allowed to attend these exhibitions.
 1989. For the first time the Latvian team of Centaurus-38 receives a permission to attend races in Germany, Denmark, Sweden and Finland.
 1992. The catamaran Centaurus 44 "Kaupo", designed for OSTAR 1976, crosses the Atlantic - from Riga to Boston and back. The skipper of the catamaran Valdis Grenenberg is one of the three constructors of the first Latvian multihull.
 1993. The shipyard for a serial production of multihulls is privatized -- the shipyard Catri is established.
 1994. Transition to modern yacht-construction materials and technology. Training the staff in Germany.
 1997. The first serially produced hydrofoil-stabilized trimaran Catri-26 is successfully tested and demonstrated in the Netherlands.

CATRI FOILERS - HYDROFOIL STABILIZED TRIMARANS

TRAILABLE RANGE

designed by Aldis Eglajs

All CATRI FOILERS combines high performance with real cruising comfort. The use of new patented hydrofoil system opens a new level of high-speed sailing to an amateur sailor. All positive aspects of the hydrofoil stabilisation are realised in this design:

- Dynamic stabilisation in both directions, which reduces pitching, excludes outriggers' bouncing, improves speed and stability in rough conditions, increases safety;
- Neutralisation of the back wave of hulls, which reduces drag and allows to concentrate the weight at the back, helps to avoid possibility of pitchpool.
- Dynamic lift of up to 90% of the full weight in the racing conditions;

CATRI FOILERS are equally convenient at sea as well as in a harbour, ashore, or on a trailer.

SPECIFICATIONS

	CATRI 22	CATRI 26R	CATRI30
LOA	7.0 m	8.00 m	9.14 m
LWL	6.6 m	7.90 m	8.90 m
Beam	6.6 m	7.55 m	7.75 m
Beam in harbour	3.00 m	3.0 m	3.2 m
Beam on trailer	2.40 m	2.5 m	2.5 m
Draft	0.3/1.1 m	0.35/1.3 m	0.38/1.35m
Weight empty	600 kg	900 kg	1300 kg
Dynamic lift	up to 90%	up to 90%	up to 85%
Sail area (up wind)	38 m ²	48 m ²	58 m ²
Main+wingmast	28 m ²	36 m ²	42 m ²
Furling genoa	10 m ²	12 m ²	16 m ²
Asymmetric spinnaker	40 m ²	50 m ²	60 m ²
Mast height	11.6m	13.6 m	14.2 m
Specific wind pressure	12 kg/m ²	13 kg/m ²	14 kg/m ²
Specific sail area	48 m ² /t	46 m ² /t	38 m ² /t
Outboard	4-8 HP	6-15 HP	8-15 HP
Number of berths	2-3	4-5	6
Headroom	1.6 m	1.85	1.85

ACCOMMODATION

Two bulkheads divide the main hull of Catri 26R, 30 into three separate cabins. There are settle berths, the navigator's place and a table in the headroom. There is a two burner propane stove, a sink, a shelf and a place for oil skins near the entrance. In the stern cabin there is a double-bearth. There is an isolated gas container and place for a battery at the very aft part of the main hull. The stern cabin is separated by a door which is also serves as entrance stairs. In the front of the main cabin there is heads with toilet. A shower can be installed in Catri 30 as an option. In the fore cabin there is a bearth and a storage space for stock in front of the fore cabin and under the bearth. Entrance to the fore cabin through the main cabin or via the hatch.

There is one cabin in Catri 22 with single forward berth as an option.

All CATRI FOILERS are equipped with opening portlights and ventilation units.

CONSTRUCTION

The CATRI FOILERS are built according to vacuum bag technology. The main hull of sandwich - core between glass/epoxy laminates. Different core materials can be used. The rudder, cross beams and foils are made of epoxy laminates reinforced by straight lied glass. The special weights and strenghtenings of carbon fiber are placed to avoid flutter of the foils and rudder at high speed. The

wingmast is of wood and plywood covered with epoxy laminate. The bulkheads and furniture are made of plywood with hard wood strengthenings to bear the load of the mast. All materials and equipment are provided by specialized companies.

Loads and durability of the whole loaded construction are carefully calculated and tested before assembling. The samples of construction materials (all types of glass/epoxy laminates, glass/epoxy/core sandwich, wire ropes and terminal joints) have been carefully tested to get exact mechanical characteristics for calculations. Main calculations' results and test reports are included in the design.

SPARS, RIGGING AND SAILS

The wing mast carries a pair of spreaders with diamond stays and is rigged with a forestay and two shrouds. Together with the furling gear, the forestay is fastened to the front part of the main hull. A special 'flying' foresail traveller allows to control the partly furled self-tacking jib correctly. By means of a special pocket, the asymmetric spinnaker may be held in readiness to be hoisted. Hoisting and reefing of all sails and dagger-board control, as well the steering of the trimaran, is possible from the cockpit.

HYDROFOIL LAY-OUT

The hydrofoil system of CATRI FOILERS includes a retractable inclined daggerboard (Bruce foil) in front of each of the outriggers, and a stabilizing foil at the stern. A third stabilizing foil is mounted on the rudder.

The inclined daggerboards are raised and lowered from the cockpit by means of ropes, which allows to reach an optimal area and angle of attack. The daggerboards are lifted out of the case and secured on the deck net at the same time as the outriggers are folded.

FOLDING SYSTEM

A modified Farrier-type folding system has been implemented to diminish the width of a normal berth in harbour conditions and during transportation by trailer.

POWER SYSTEM

Auxiliary propulsion is provided by an outboard fastened to the rudder, which can be lifted together with it or separately. This solution provides better manoeuvring possibilities, especially when the trimaran is losing speed. The 12 v electrical system is charged from the outboard alternator and also through a charger from shore power.

SAFETY

The trimaran has an increased stability. Its width surpasses traditional parameters by 1 -1.5 m and 110% buoyancy outriggers are the full length of the boat.

To increase the safety and efficiency of the hydrofoil system, the weight of the boat is maximally shifted to the rear. As a result, the front part of the trimaran is very light, but the stern of the main hull is widened and the cockpit is lengthened up to the dimensions of the main hull. In this way the crew are allowed to place themselves in a position to achieve the most favourable dynamic lift of the rear stabilisation hydrofoils. At the same time the possibility of pitchpool is excluded.

The front part of the outriggers is highly hydrodynamic, which prevents danger in case of wave piercing. In case of steering mistakes, the trimaran is protected by a special device, which at dangerous heeling releases all the sheets of the sails automatically. All this allows even a less experienced sailor to make use of the speed potential of this hydrofoil assisted trimarans.

PERFORMANCE AND RACING POTENTIAL

CATRI FOILERS' high stability enables them to carry an augmented sails area per each ton of weight while maintaining an optimal hydrofoils angle. In strong wind dynamic stability and lift reaches the maximum and the main hull and bow rise, but the leeward hull is immersed minimally. In these conditions the water drag diminishes and the speed of the trimaran exceeds the 20 knots limit.

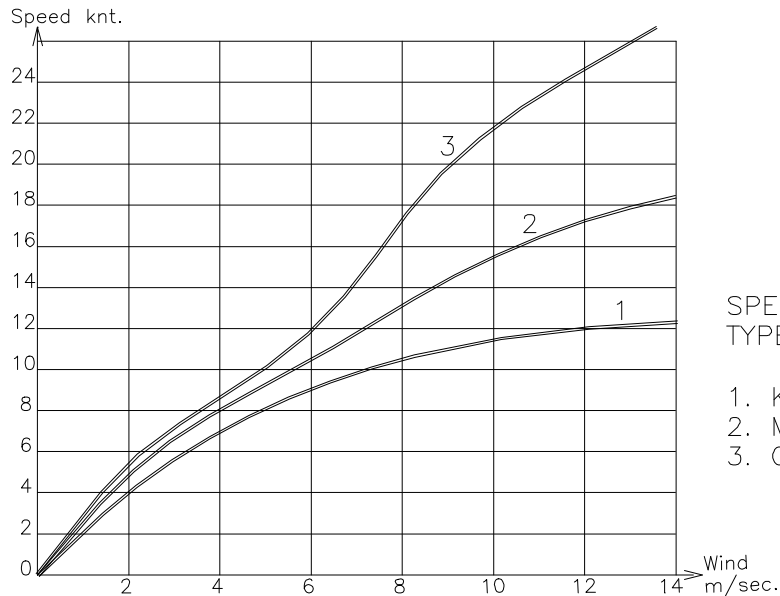


FIG. 1


SPEED GRAPH OF DIFERENT TYPES OF SAILBOATS

1. Keel yacht
2. Multihull
3. Catri Foiler (hydrofoil stabilised trimaran)

CATRI 22 and CATRI 26R are designed for races under Micro IMMCA and MULTI 2000 rules, as well as class racing after elapsed time. Seaworthiness and real cruising comfort permit participation in long distance competitions and ensure durable cruising.

PLANS FOR HOMEBUILDERS available for Catri22 and Catri 26R. Recommended set: building plans + ready made rudder and hydrofoils. Ordinary building methods may be used (plans can be completed with buiding instructions from Internet).

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 **CATRI FOILERS - HYDROFOIL ASSISTED TRIMARANS -**
PRELIMINARY PRICELIST 1/1999
Prices in US\$ excluding VAT, without sails, engine, transport

Catri foilers	Catri 22	Catri 24	Catri 26R	Catri 30	Catri 39
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Standard specification

Sail away

Casco mouldings, bulkheads

Wingmast

Main hull's moldings

Outriggers' mouldings

Cross beams' mouldings

Rudder's and foils' mouldings

Building plans

Study plans -

NOTE: Discount for first sets

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