

PRESS KIT MIRABAUD LX 2010





THE HULL-LESS SAILBOAT	2
ORIGINS	4
FOIL BASED SAILBOATS	5
2009 ASSESSMENT	6
2010 IMPROVEMENT	7
CREW	8
TECHNICAL TEAM	10
MIRABAUD	11
THOMAS JUNDT	13

MIRABAUD LX 2010

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MIRABAUD LX

A one-of-a-kind *EXPERIMENTAL* sail boat



THE HULL-LESS SAILBOAT

The **Mirabaud LX** is an experimental sailboat, unique in the world, born out of the vision and experience of sailor and engineer Thomas Jundt. It is designed to skim on its hydrofoils, and is the first sailboat to dispense with the need for a hull, though a certain degree of floatability is still needed for pullaway and for sailing in light wind.

The boat features a load-bearing tubular structure in carbon fibre, a remarkable engineering feat. Every last part is optimized for light weight, so that the craft can lift itself above the water as soon as possible. The Mirabaud LX is a technological breakthrough that could well revolutionize the sailing world, in much the same way as multihull technology did some thirty or so years ago.

In 2008 and 2009 the boat competed in Lake Geneva's most important regattas and made several record attempts. The Mirabaud LX was the first boat to establish a time of reference on Lake Geneva over 1 kilometre, at an average speed of 20,46 knots. The hull-less boat also won the Geneva-Rolle-Geneva 2009 regatta in the monohull category and set a new record for the event, completing the race in 3h43'47".

TECHNICAL SPECIFICATIONS

Overall length :	10 m
Hull length :	8,5 m
Overall width :	5,4 m
Structure width (without ladders) :	1,8 m
Unladen weight: 170 kg (including 25 kg for foils)	
Overall weight with crew :	410 kg
Sail surface (upwind) :	32 m ²
Sail surface (downwind) :	78 m ²
Foil surface :	0,7 m ² (2x 0,35 m ²)
Structure: 80 m of carbon fiber tubes (44 mm in diameter and 1.2 mm thick) assembled as a load-bearing structure.	



“The Mirabaud LX project is unique in the world; it represents a real challenge, intellectual, technical and sportive”.

Thomas Jundt

Origins

When watching a Moth foiler in 2005, Thomas Jundt started wondering, “if it works on a little dinghy, it should work in our 18-footer”. So he contacted the inventor of these weird and wonderful boats, Australian John Illet, to talk about the project. Illet took to the idea immediately and set to work; a large crate containing the precious fixtures (centreboard and rudder foils) came through a few months later.

Jundt and his crew had set themselves the target of skimming over a distance of 100 metres by the end of the first season. In fact, the very first outing they were up there for 500 metres. Pictures of these mythical first flights appeared on all the main sailing websites and in many nautical magazines.

Encouraged by the very successful performance achieved over the first two seasons, the Geneva based engineer decided to improve the boat, which held enormous development potential. To continue his project, Jundt would work from the principle that “since the hull is only needed for floatation when the boat’s not skimming, or in very light wind, or during certain manoeuvres, why not bring it down to a strict minimum?”. So the new boat would be

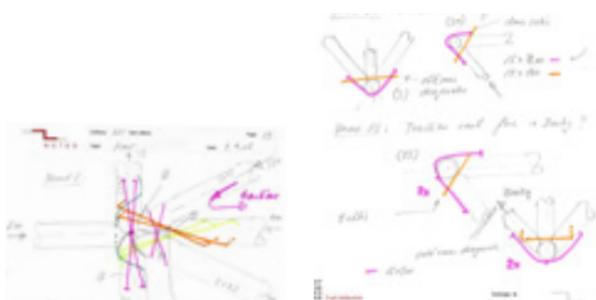
highly optimized to concentrate on the essential: foils, ladders and rigging.

Developed by the constructor Mathias Bavaud, the load-bearing structure made of carbon fiber tubes was built in such a manner as to support the ladders and the rig of the 18-footer.

The float and the mast were changed for the 2009 version of the boat. The 2010 version incorporated a third float as well as an adaptable daggerboard designed to accommodate different sized foils.

The Mirabaud LX incorporates many technical improvements and all of its elements have been specifically designed and built. There is not one single part left from the original 18 footer. The ladders and the mast have been changed for the 2009 version of the boat.

The bank Mirabaud & Cie has been supporting this project since its onset in 2008. The purpose of the partnership is to allow Thomas Jundt to pursue the development of the boat over three years.



FOIL based sailboats

Sailors, too, fall prey to the dream of Icarus, perpetual source of creativity and inspiration. For a long time now it has been clear that the quest for speed can best be fulfilled by challenging the Archimedes effect, much like aviators challenge the law of gravitation. The parallel is apt, because the idea here is to fly rather than float.

Like all foilers, the Mirabaud LX skims over the water on load-bearing foils (also known as hydrofoils) rather than riding on its hull. The boat is hoisted out of the water, which reduces the volume of water displaced by the hull under the principle of Archimedes, and thus reduces resistance to forward motion. By sidestepping this main physical constraint, the boat (if “boat” is still the right word) can achieve speeds previously inconceivable.

The idea is not a new one: people have been making hydrofoils for around a century. As in the early days of aviation, the many attempts to skim over the water have varied from the downright cranky to the wholly convincing. Half-way credible projects began to appear in the nineteen-thirties, but true potential only emerged in the early seventies, with Icarus, a modified Tornado.

Hydrofoil experimentation in ocean racing boats came in the eighties. Then there were the one-off projects like the Willywaw. The Charles Heidseick IV is without a doubt the trimaran the most representative of this exploratory period, though its capacity for flight remained theoretical, since the boat was never able to meet its weight budget.

All multihull ocean racing boats today use foils, and boats like the Hydroptère approach speeds of 50 knots (92.6 km/h). Then for a few thousand pounds you can buy a hydrofoil Moth (a dinghy of 3.3m) to fly over the surface of the water and take part in an international regatta circuit that attracts some 70 competitors.



▲ James Grogono's ICARUS, 1976
Howard Apollonio's LYING FELINE, 1966 ▼



After 2009...

While the 2009 season's results were largely positive, Thomas Jundt and his team found that improvements could still be envisioned.

- The wave-height sensor which adjusts the front foil has shown its limits in choppy conditions. It was very difficult to take off in certain conditions, with fairly strong wind and waves.
- The hull is quite conclusive, but its volume can be expanded in order to improve buoyancy in Archimedean mode to facilitate tacking and allow gliding on the water when it is not possible to "fly".
- The foils work well. They allow take off in as little as 8 knots, which is appreciable on Lake Geneva. However the speed limit of the boat is approx 23 knots. To attain higher speed, the surface of the foils must be reduced.

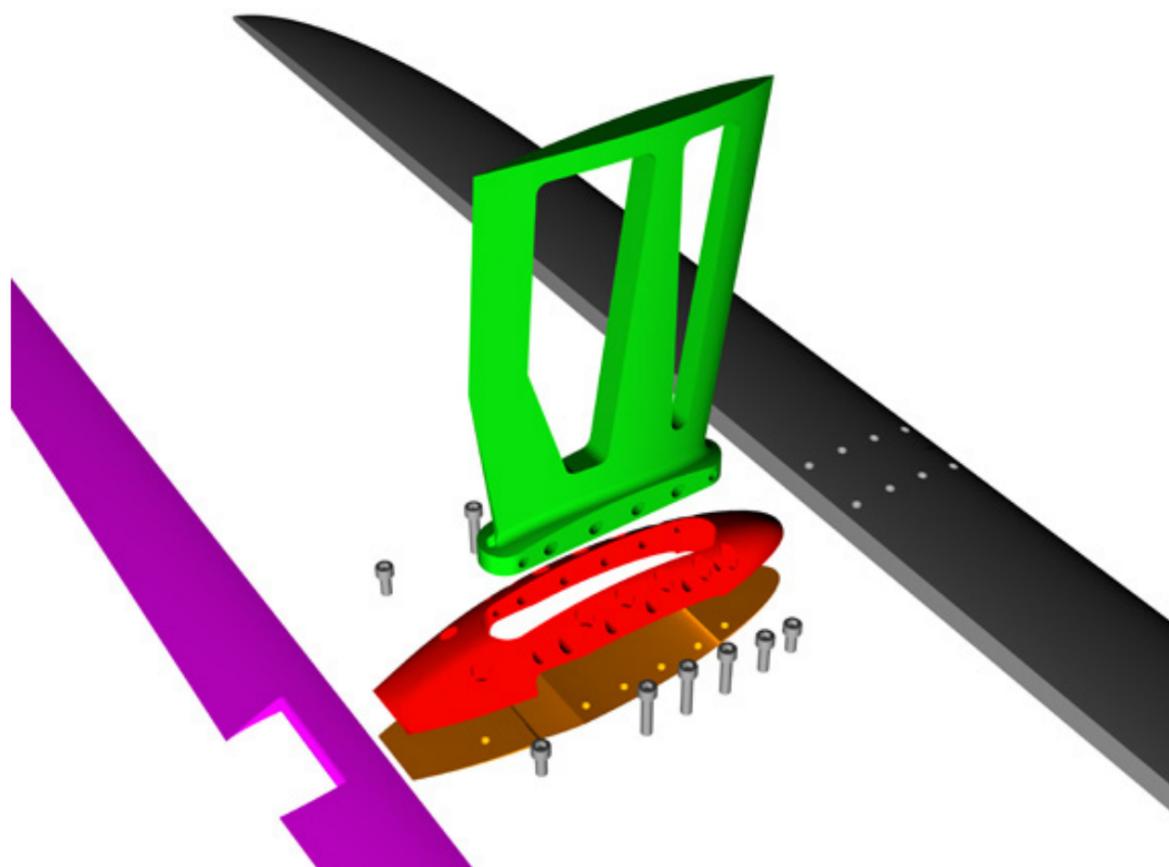
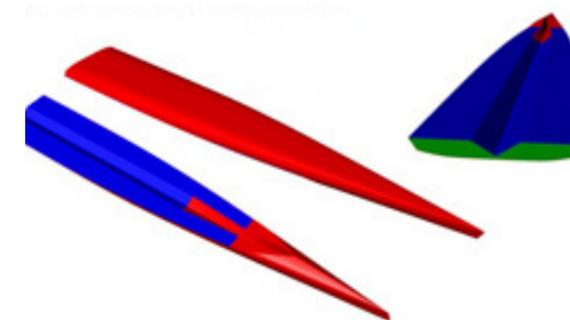


THE FOLLOWING IMPROVEMENTS HAVE THEREFORE BEEN CARRIED OUT OVER THE WINTER OF 2009 - 10:

- A manual control of the boat's longitudinal trim has been installed on the ladders, allowing a crewmember to adjust the boat's sailing angle. The foil is therefore no longer mechanically subject to the wave height but is adjusted manually by a crew member who can anticipate the waves and the stability of the boat. This new feature should enable the boat to take off even in choppy conditions.

- The float has been modified. The volume has been increased from 800 to 1200 liters, while the stern now measures 1.2 meters; the same width as an Australian 18-footer. The shape of the forward hull facilitates tacking whereas the back of the hull should improve gliding in light wind.

- A new system has been developed allowing for easy changing of the foils. An improvement which will considerably reduce costs, as the horizontal surfaces can be removed separately. A new set of foils, 30 percent smaller for the front foils, and 70% smaller for the rear foil, will be tested during record-setting attempts. Indeed, the crew had observed that beyond a certain speed, the boat is no longer supported by the rear foil which only acts as a stabiliser. With this new combination of foils, the Mirabaux LX should take off at 15 knots and reach a top speed of 28 knots.



2010 PROGRAMME

- 5 June: Geneva-Rolle-Geneva
- 12-13 June: Bol d'Or Mirabaud
- 17 July: "6 heures de Nernier"
- 22 August: Bol d'Or du Lac de Joux
- 16-22 October: Weymouth speed sailing week
- Record-setting attempts on Lake Geneva : kilometer, hour, Ruban Violet

2010 OBJECTIVES

- Succeed in pushing the new set of foils to their maximal speed
- Beat the records set on Lac Léman, namely the Kilometer, the Hour and the Ruban Violet
- Participate in the Weymouth speed sailing week
- Validate the changes made to the sailboat
- Continue training and further improve the handling of the boat



THOMAS JUNDT ▲

PROJECT MASTERMIND AND CENTRE HAND

Age 52, civil engineer
married, with two sons, 16.

Thomas Jundt went to school in Bern, Switzerland, and graduated as an engineer from EPFL in 1981. Five years later he founded the civil engineering firm Thomas Jundt Ingénieurs Civils SA, which today employs around twenty people and covers all construction fields. Mr Jundt has sailed on many boats. He has been a member of Geneva's reputed CER regatta training centre since

1984, and skippered the Ville de Genève boat on the Sailing Tour de France event in 1986 and 1987. He sails in international 505 class, with crewmate Antoine Ravonel, and has pioneered sailing with Australian 18-footers on Lake Geneva. Thomas Jundt and his crew have won the Geneva-Rolle-Geneva race three times and the Bol d'Or class L twice.

The Team

ANTOINE RAVONEL ►

HELMSMAN AND CAPTAIN

Age 51, sports teacher
married with two daughters, 11 and 18.

Antoine Ravonel went to school in Geneva and graduated in physical and sports education from the University of Geneva in 1982. He works as a primary school sports teacher in Geneva. Mr Ravonel has been sailing since the age of 12 in Vaurien, Laser, 470, 505 and Formula 40 classes. He was Swiss junior champion in Laser class and

member of the Cassiopée team (Formula 40) for three seasons. With 18 years' experience on the European Australian 18-footer circuit, Antoine has very sound credentials as Mirabaud LX helmsman.



ERIC GOBET ▲

NUMBER ONE

Age 47, jeweller and gem setter,
married with daughter, 13.

Eric Gobet qualified as a jeweller and gem setter in 1996, and has been practising this profession ever since. He's been sailing for 20 years, often with racing multihulls. He took part in the European Hobie Cat championships in Germany in 1992, and in the 1994 world championships in France. Mr Gobet is a founder member of the Corsier

Cool Cat Sailing School. With 12 years' experience in Australian 18-footers on the European circuit, he makes an ideal third hand on the Mirabaud LX crew.



Technical team

MATHIAS BAVAUD

AGE 35, BOATBUILDER

Builder

After completing his apprenticeship with Burkhalter in 1994, Mathias Bavaud joined the renowned Décision SA team, staying there till 2000. Applying exceptional skills in composite materials such as kevlar and carbon fibre, he completed a number of individual projects in custom car preparation and competition windsurfing equipment. Impressed by the quality of his workmanship, several vendors commissioned him to design their own specific product ranges. To open opportunities for developing his very considerable know-how, he founded MB Composite in 2001. Mr Bavaud is remarkably versatile, taking on projects as varied as a pulka for polar expeditions and the Mirabaud LX flying sailboat.

HUGUES DE TURKHEIM

AGE 62, ENGINEER

Foils consultant

Hugues De Turkheim left engineering school three months before graduation day, back in 1972, to go off and build Vendredi 13, a 40 meter yacht designed by Jean-Yves Terlain. And he's been making unconventional decisions ever since. His whole career has been guided by inspiration and enthusiasm, and would make a thrilling book. He's been a consultant on many sailing and speed projects, and was one of the best French windsurfers of the eighties. Today, De Turkheim is a leading specialist on hydrofoils, for all kinds of projects: a 60-footer multihull, a world speed record bid, and the Mirabaud LX.

JEAN-PIERRE ZIEGERT

AGE 42, REGATTA COACH

Coach

Jean-Pierre Ziegert was apprenticed to celebrity cook Freddy Girardet at Crissier, and graduated from the Vieux-Bois restaurant and hotel school in 1987. He's been a sailing fanatic since he was a kid, and has sailed on pretty much everything that floats in every corner of the globe. He sailed with Pierre Fehlmann on the round-the-world race in 1989-1990, and took part in the 1996 Atlanta Olympics, in 470 class. He's worked as a coach on many projects, including Décision 35 and Ventilo M2

JEAN-MARC MONNARD

AGE 45, SAIL DESIGNER

Sail designer

Boatbuilder Jean-Marc Monnard completed his apprenticeship at the Luthi boatyard in Crans sur Céligny, then joined Décision SA before going on to specialize in sails, a discipline that makes full use of his regatta experience. He joined Europ'Sails in Geneva as a sail designer in 1998, and has been a partner with the firm for several years. Mr Monnard sailed in international 470 class during the eighties and today excels in Melges 24, a notoriously demanding class. No stranger to innovation, he designed and built his own foiler. His rigour and creativity make him a key member of the Mirabaud LX project.

SÉBASTIEN SCHMIDT

AGE 48, NAVAL ARCHITECT

Naval architect

Sébastien Schmidt graduated as an interior architect from the Geneva School of Applied Arts, then pursued his interests in sailing and aviation before opening his naval architect's office in 1983. His skills are greatly appreciated among the nautical community, and have been called in on a number of avant-garde projects. His exceptional experience will prove invaluable on the Mirabaud LX project. "What I like about this project is the opportunity to work with forwardlooking entrepreneurs who are pushing back the technical and cultural limits to achieve a major breakthrough."

MIRABAUD partnership



MIRABAUD PARTNERSHIP: ORIGINAL SPONSORSHIP AND CORPORATE PATRONAGE POLICY

Mirabaud sees involvement in initiatives conveying a strong image of professionalism, ethics and performance as a powerful means of supporting brand development at local and international scale. For several years now, it has been running an original sponsorship and corporate patronage programme addressing exceptional people in fields as diverse as art (collection by Geneva painter Pierre-Louis De la Rive, 1753-1817), adventure (Mike Horn),

sport (Bol d'Or Mirabaud regatta on Lake Geneva and Ynglings Olympic sailing champions), ocean racing with Dominique Wavre and classical music. In all these operations, the emphasis is on excellence, performance, and shared human values. ➤



MIRABAUD AND SAILING

Mirabaud is supporting the Swiss sailor **Dominique Wavre** for the Barcelona World Race 2010-11 (double-handed round-the-world race), the Transat Jacques Vabre 2011 (double-handed transatlantic race) and the Vendée Globe 2012-13 (single-handed non-stop round-the-world race). The partnership between Mirabaud and Dominique Wavre is a long-term venture, with an international program founded on sporting, technological and human values.

The Bol d'Or Mirabaud is one of the great classics on the international calendar. Organized by the Société Nautique de Genève, the race is Europe's largest regatta held on a lake (123 kilometers). First held in 1939, the regatta now attracts nearly 600 yachts. The world's greatest yachtsmen have participated in and won the Bol d'Or Mirabaud, including Loïck Peyron, Ernesto Bertarelli, Alain Gautier, Russell Coutts, Philippe Durr, Eric Tabarly, Dennis Conner and many others.

The Mirabaud Trophy is a yearly championship for "Surprise" one-design monohulls. The annual seasonal championship calls for a total of seven regattas on Lake Geneva; it brings together some fifty boats.

Events: Mirabaud is a partner of the Swiss Sailing Night, a gala evening that honours the world's finest talent in competitive sailing in Switzerland. Likewise, Mirabaud gave its support to the first two editions of the World Yacht Racing Forum, an annual event that brings together competitive sailing's best and brightest.

MIRABAUD AT A GLANCE

Mirabaud & Cie, private bankers, was created in Geneva in 1819. Originally a private bank operating solely in Switzerland, Mirabaud has since developed its brand on three continents. Mirabaud offers tailor-made services in the following areas: private banking (portfolio management, advisory services), asset management (research & analysis, traditional and alternative funds and fund management, balanced mandates) and intermediation (brokerage, corporate finance and debt capital management).

Founded: **1819**

Funds deposited: (31.12.10) **CHF 24 billion**

Workforce: (12.31.08) 527 (338 in Switzerland) - 607 mid 2010

Offices: **10** (Geneva, Basel, Zurich, London, Monaco, Paris, Hong Kong, Montreal, Nassau, Dubai), form mid 2010: Madrid, Barcelona and Valencia.



THOMAS JUNDT INGÉNIEURS CIVILS SA

The civil engineering firm Thomas Jundt Ingénieurs Civils SA comprises a group of specialists offering services for civil engineering and planning. It was founded by Thomas Jundt in 1987, and management is today split between three partners, all civil engineers: Thomas Jundt, Sylvain Dubois, and Gaston Krüger. On 1 January 2006, the partnership was incorporated as a société anonyme under the name of Thomas Jundt Ingénieurs Civils SA.

Business has grown considerably since 1997, and the company today employs about twenty people, including ten civil engineers. Development prospects look bright, and include two recent high-profile projects: the development of the site Merc-Serono in Fenil sur Corsier and the 400-ward BDL2 building at the Geneva Hospital. Thomas Jundt Ingénieurs Civils SA fields up-to-the-minute know-how in dynamic parasismic surveys in Switzerland, for applications such as reinforcement of existing buildings, as in current renovation work on the TSR tower.

Through its involvement in the Mirabaud LX project, Thomas Jundt Ingénieurs Civils SA has made substantial progress in its understanding of carbon-epoxy composite materials. All structural calculations are performed in-house, and special tools have been developed for analysing strength and buckling of carbon tubes. The project has also opened opportunities for training personnel on powerful modern 3D presentation systems. All drawings and 3D images are also produced in-house. The spirit of the Mirabaud LX project –innovation, challenge and technical prowess– is totally in line with the rationale of Thomas Jundt Ingénieurs Civils SA.

More information: www.jundt.ch.



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