Glide Free Design

Development of a foiling Laser® dinghy

Inspiration

To lift and glide silently and effortlessly above the waves with exciting bursts of speed has long been an ideal for those who dream! Having developed the first ever centreline foils used on Moths, the concept of providing the thrill of foiling to all sailors was the next obvious step. Surely there was an opening for simple foils on a standard type of boat that anyone can sail, without too much hassle, at an affordable price!

Motivation

When a friend challenged me to “put foils on a Laser®”, my first thoughts were “could this really be done”? No one had done it before, so it would really be a challenge to make something that seemingly should not fly, perform the impossible, akin to fitting wings to a bumble bee!

While the task originally seemed simple enough, just put some foils from my Moth onto a Laser, there were quite a few obstacles, not the least being that Lasers are heavy and underpowered. They do however provide a very interesting foiling platform. Despite concerns from the ‘experts’ that Lasers would be far too heavy, too weak, too slow, have unsuitable rigs, are not worthwhile and even impossible to foil etc, this only proved more of a challenge to prove them wrong.

Ideally the “criteria” for a successful foiling Laser should include: simple to rig and easy to launch in shallow water, able for any sailor to manage, automatic control with no need to ‘tweek’ the settings on the water, easy to clip on without altering the existing boat and robust construction at a reasonable cost, which I feel we have succeeded in not only meeting but surpassing!!

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First ever foiling Laser® in 2009

So, after several months of testing, we finally got a Laser up and going in 2009…
Not just any Laser®, it was Michael Blackburn's boat from the Sydney 2000 Olympics!

Foiling Laser design...

To make foiling simple, practical and fun in a Laser®, we needed to address the many limitations of today's foiling dinghies. We have not just copied what has been used before, but have developed a completely new foiling system with flapless foils and integral wand which utilizes many unique design features. These features enable easy launching in shallow water, safe efficient and fast foiling, along with good displacement sailing performance in light winds.

This has been achieved without any alteration to the standard Laser hull. We use a simple, toggle pin to attach the foils, which are strong, stiff & robust, employing standard materials at a reasonable cost. Connect and detach in minutes!

Centrecase insert

Gearblock with toggle pin attaching to the insert.

At the same time we have achieved a more stable Laser®, easier to sail and right after a capsize, with a much more pleasant, lighter helm and an impressive turn of speed.

Performance - the aim has been to give everyone the chance to experience the thrill of foiling. Just as the first windsurfers enticed thousands of people out on the water, reaching back and forth in a nice breeze just for the fun of it! So now you can foil your new or even your old Laser® at high speed on a nice day. You can race too, if you like, but foiling for fun has been our primary aim.

Sure, with double the weight, half the beam and much smaller sail area you could never expect a Laser® to perform as well as a Moth. Takeoff will always be on a reach, but I think you will be surprised at what can be achieved once you are up and going!! How does 20-25kts on a Laser® sound!! Unrealistic?....well lets see! During just one sail in a good breeze, one 96Kg test pilot rated it as fast as his F18 Catamaran on a reach!

Surprisingly, we found that Lasers® are not such a bad foiling platform after all. They actually have less wind drag than a Moth, which at 20kts makes up around half the total resistance, so there are some significant potential advantages.

Handling

The foils and the way we have added them, actually make the Laser® dinghy easier to sail in displacement mode, with a nicer movement, a much lighter helm and easier to right from a capsize. They make the boat much more stable and even sail well upwind in displacement mode. When they crash it is always a soft landing and in light air they are still pleasant to sail.

Launching from a beach trolley

Inserting centreboard in shallow water

Launching

We have removed the inherent barriers to foiling that are a major issue even for Moths, that of launching and retrieval. Moths rig on their side and are then carried (35Kg all up) into the water sideways by one person until neck deep, before leaping aboard. Try doing that with an 80Kg fully rigged Laser® on your own!! We have instead aimed to launch our foiling Laser® from a beach trolley in the normal way, in knee deep water, insert the foil and just hop on and sail away. The rudder neatly retracts

backwards in the existing rudder box. Even with the centreboard foil fully retracted, it easily clears the boom, so you don't have to worry about surprise gusts hitting the boom on the centreboard and capsizing when launching.

The rudder retracted ready to sail off the beach in shallow water

Rigging

We have made no changes to the standard Laser® rig setup. It had to be able to fly with a standard boat and rig. Of course the rig can be significantly improved, but our aim is simplicity and low cost. While we have naturally progressed to developed carbon spars with specialised fully battened foiling sail, the performance with the standard rig is surprisingly good downwind! So we believe it is best to begin with a fully standard Laser® hull and rig.

One interesting result of our testing has been that a Laser® Radial rig is actually much faster and easier to handle than a standard rig once the breeze is over 15Kts, as it has much less drag when foiling at high speed. In stronger winds the 4.7 rig is even better.

Foiling in 12-15 kts of wind with Laser® Radial sail.

Attachment

A key requirement was that there be no modification to the existing boat. The foils must be retrofitted without the need for even a screwdriver. There can be no drilling of holes or changing the boat in any way. The skipper should be able to race in the morning as a legal standard Laser® and go foiling in the afternoon for fun with minimal

effort to change foils. We have certainly achieved this goal, the entire changeover requires insertion of just one toggle pin to hold the foiling centrecase insert in place!!.

We have also enabled the foils to easily pull apart using a simple spring clip. This makes it very easy to transport, store and wash the foils after use.


Simply depress the spring clip and pull the foils apart.

Strength

We have supported the boat on a large flange which spreads the load over the entire surface of the vertical webs in the centrecase. After 18 months of extensive trials there is no sign of any structural damage, cracks or anything!!. The standard rudder fittings are still OK too!! The materials of construction are simple, strong and inexpensive. Our foils are relatively short, stiff and are made from sturdy corrosion resistant materials.

Rigid attachment

The design and position of the main load bearing pin is just behind the centre of lift of the main foil. The upward load when foiling, locks the foil in place against the forward edge of the centrecase. Which prevents the foils moving laterally. The vertical foils are short and very stiff, so there is no flex to combat and no need for exotic materials.

Safety

When you hit a jelly fish, sandbank etc, you do not want the foil to break the boat. We have a clever system which automatically releases under impact, relieving pressure on the boat. I have accidentally hit many objects such as mooring lines and large jellyfish and never had an issue with the boat or mechanism. There are no shear pins, you simply re-engage the foils and keep sailing. If the wind is too strong and you want to sail home without foiling, you can simply disengage the foil and sail in normal displacement/planing mode.

Wand mechanism retracts within the centrecase for easy launching and retrieval

Foil mechanism & wand

The real challenge has been to come up with a way to retract the foils, rake them for and aft to engage and disengage and yet foil under control with low drag.
Control is with a unique wand, integral to the centreboard. This overcomes the need for attachments and linkages. There is a direct connection to the lifting foil, which is always under compression with no slop in the system. The foil disengages automatically when it is rotated aft, for safety, as well as providing minimal drag for displacement sailing. The wand also cleverly retracts inside the centrecase as the centreboard is raised.

Technique

Sailing technique in a foiling Laser® is a skill to be honed. In strong winds the Laser® pops out of the water on a reach easily, as soon as you sheet on. On a broad reach you just sit back and enjoy the ride, but on a tight reach you will need to lean hard and heel slightly to windward to take off. The skill then is to stay up, under control and make sure you trim for the changes in apparent wind. As your top speed rapidly increases, the boat begins to ride higher. To keep it in the water, simply move your weight forward. While it does not at first seem a natural reaction, the boat becomes more stable and even faster. For and aft trim of your body weight is an important tuning control you exercise over the boat, enhancing your skill in this area greatly improves performance.

Perhaps the greatest skill is required when foiling to windward. You will need to lean very hard, as well as trim and steer very accurately. Keeping the boat heeled to windward is critical and finding the groove and keeping the boat there is a real challenge.

Upwind foiling takes skill and stamina

In marginal foiling conditions of 8-12kts, it is necessary to work the boat with your body to get an early takeoff. There are 3 main elements to this, a) broad reach and sit well aft. b) Lean hard while heeling the boat to windward keeping a neutral helm, c) bear away and sheet on as the boat lifts. It is a delicate art, requiring practice, but you are well rewarded as the boat foils early and glides so effortlessly over the waves.

Driving the boat hard at top speed is also an art, as foiling is different to other methods of sailing. If you are hit by a gust do not round up, the boat rig is loaded and starts to drive down, you simply hang on, bear away, roll your weight aft and wait for it to recover. If on the other hand the sail luffs if you ease the sheet or even if you sail into a lull, the boat rather unexpectedly flies high in the air as the load on the foils is reduced. It is best to recover by sheeting on and bearing away. It is a real challenge to experiment and develop the skills to get the best out of the boat, even for experienced skippers. For inexperienced skippers it is quite simple to bear away and foil off downwind at high speed. The boat remains remarkably stable.

Foiling dinghies provide a thrill unlike other forms of sailing. Managing the speed and acceleration is not a natural reaction, even for experienced dinghy sailors. Upgrading your Laser with foils is akin to moving from a Dinghy to a Sailboard or from a Skateboard to a Ripstick, it is not something that everyone can master at their first attempt.

To manage a sailboard for the first time usually takes a few days of practice, persistence and even professional instruction. With a foiling Laser you need to learn how to take off and then stay upright. You will perhaps for the first time experience true apparent wind sailing and will be on the edge of control. You will need to be patient and very persistent to get it right... but you will be well rewarded.!!

Incredibly, Glide Free foils supercharge your Laser and require a matching level of skill to master. Foiling is certainly not for the novice or feint hearted sailor. As the boat lifts and takes off, it accelerates very quickly and the apparent wind moves ahead, luffing the sail and providing drag. If you do nothing or do not react quickly enough, the boat

will fly high and then crash, fall in to windward or both!! A little embarrassing and perhaps frustrating until you learn to bear away and sheet on quickly. Trimming, leaning and steering in the right proportions is absolutely essential.

Be aware that you should first start in moderate, steady winds on an open bay without too much traffic. Even stopping requires some special skill!

Glide Free Design provides you with the equipment to experience foiling, but cannot train you. That is something you have to do yourself. We supply instructional videos and provide a forum for sailors to share experiences, but we cannot turn you into a master foiler... that is up to you!

Fun to sail

The most important design feature of all has been to make the boat simple to rig & launch, as automatic as possible, easy to foil, one design, affordable and most importantly fun to sail, in keeping with the original design concept of the Laser® dinghy. We believe we have really achieved these goals in every way.

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Features and Benefits

Here is a list of the key Features, benefits and the advantages of Glide Free Foils

Features	**Advantages**	**Benefits**
Retractable foils	Launch in shallow water	No need to rig the boat on its side or get wet up to the neck when launching
No fastenings	Sail your boat as a standard race ready Laser® or go foiling	Versatile without compromising your racing Laser®
Retrofit kit	Fit to new or old boats	No need to buy a new boat
Standard rig	No need for special sails or spars	Cheap
Flapless foil	Always at lowest drag	Fast
Fully articulated foil	Boards can be raked backwards	Easily retracted rudder Centreboard can be disengaged for displacement sailing
Gear block	Engage/Disengage lifting foil Safety release Adjust ride height	Fast displacement sailing Don't destroy the boat when running aground Safe foiling in heavy winds
Integral wand	Self contained & retractable No need for fastenings No slack in the system Works automatically	Nothing to attach No changes to your boat Positive height control Simplicity, no controls required
Safety clip on shock cord	Holds board in position Locates foil to gearblock Hold board forward Holds board in gearblock	Prevents foil falling out Prevents fingers getting caught Easy to engage Hold board up when launching Safety release when running aground
Centrecase insert	Guides centreboard Easy to attach with toggle pin Large flange spreads load	Protects the boat No fastenings on boat Quick to rig Strong & does not damage hull
Spring clips	Connect/disconnect foils	Easy to pull apart and assemble Convenient to transport
Standard Laser® rudder box	Uses standard Laser® fittings and tiller	Reduces cost Parts are interchangeable
Replaceable wingtips	Easy to remove for flushing Simple replacement	Reduces maintainence Easy & cheap to change if damaged
Water flushing hole	Easy to flush clean	Keeps the system working

		properly
Features	**Advantages**	**Benefits**
Forward raked rudder	Prevents ventilation Balanced blade	Always in control Light helm at all times
Laser® hull	Popular boat Low drag for high speed foiling Soft landing when crashing Stable	You probably already have one Fast and exciting Forgiving A pleasure to sail
Short foils	Clears boom Stiff and strong Safe low level foiling	Doesn't capsize on the trolley Cheap and won't break Won't damage you or the boat

History

It all began in Grafton, NSW when Ian Ward had the opportunity to sail a Hobie Trifoiler. Incredible performance in a breeze, but how much better would it be if it were much lighter, simpler and perhaps even faster!!

As an avid Moth sailor, Ian built a trifoiler Moth in 1996, but was disappointed as it was too stable, cumbersome and did not handle like a dinghy. After seeing Rich Miller's foiling sailboard, he was struck by a magical thought..... what it were possible to foil a Moth on just the centreboard and rudder foil?

The benefits of heeling to windward for increased stability and lift from the rig, as well as the low drag from fewer foils were immediately obvious, what was not clear was how to make it work and if it was even sailable. Most people

Worlds first centreline foiling Moth

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Ian Ward – Pittwater December 1999

First Dinghy Foiler - Moth.
Ian built his first foiling Moth in 1998 using centreline foils and proved it could indeed be done in November 1999. Moth class rules were subsequently changed, restricting foils to be located on the centreline. Complying with these modified rules, John & garth Ilett independently developed their own foiling Moth in Perth, on which all of the current foiling Moths are based.

Ian moved onto other projects but never lost the passion to place foils on other dinghies. It was not until 2008 that Peter Stephinson challenged Ian to put foils on a Laser®. Even today, experienced sailors find it hard to believe that it is possible to foil a low tech, heavy and underpowered Laser®… but seeing really is believing !!

Worlds First "Foiling Laser®" 2009.
Ian Ward - Glide Free Design

At first we met very many challenges but finally proved it could work on Pittwater in November 2009. Peter took the video and it was decided to design a version which was far more practical than with the existing foils used in Moths, which require launching the boat on its side in deep water.

After several years of further development we are now able to bring high tech foiling to low tech boats, a simple fully integrated, retractable foiling system for Laser® dinghies.
We now offer all dinghy sailors, even those as heavy as 120Kg the opportunity to experience the thrill of foiling faster than the wind on a simple cheap boat, without the hassles of rigging and launching of Moths and other foilers.

Glide Free Design

No need for special attachments or fixings or modifications to your existing boat. We provide a 3 piece foiling kit, utilizing your existing rudder box.
A unique and fantastic experience never so affordable on a sailing dinghy.

Peter and Ian formed Glide Free Design in 2010 and began production of the Glide Free Foils for Laser® in 2013.

Glide Free Design

Glide Free Foils are invented, designed and manufactured solely by Glide Free Design Pty, Ltd and are fully compatible with a standard Laser® hull.

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