

Performance

Hydraulink Cup Update

ISSUE 1. August 2012

Hydraulink is a supplier of high performance Hydraulics to Emirates Team New Zealand

Hydraulink
Hose and Fittings

Emirates **TEAM**
NEW ZEALAND
OFFICIAL SUPPLIER 2013

H



Best under pressure

Loyalty

Hydraulink
Hose and Fittings



Grant Dalton



**Hydraulink's
commitment
over the years**



**24/7 Service
with our
dedicated and
skilled team**

Emirates Team New Zealand has come to rely on Hydraulink, their products, systems and expertise, since 1995, the year Team New Zealand brought the America's Cup back home to New Zealand.

Hydraulink was there for the successful defence at Auckland in 2000 and they have been with us ever since.

For the 34th America's Cup in San Francisco next year we are once more leaning heavily on the Hydraulink team

The AC72 is a remarkably "technical" boat; the hydraulic control systems for the wing sail are complex in the extreme.

Downwind in a 20 knot breeze the AC72 has the potential to reach speeds of more than 40 knots (75 km/ph). A control failure at that speed does not bear thinking about. We're thankful that Hydraulink is heavily involved with the team and minimising that risk.

Signed
Grant Dalton

Since 1995 Hydraulink have been involved in the ongoing development of the Emirates Team New Zealand challenges and defences of the Americas Cup.

Hydraulink are a proud New Zealand owned company who are committed to excellence, and like Emirates Team New Zealand we strive to be the best. We believe in building relationships with clients and suppliers and this shows with our strong commitment to supply the team with the best hydraulics knowledge and products available from 1995 through to the 2013 challenge.

Prior to finalising the design and development, Hydraulink and the Emirates Team New Zealand designers and engineers have been involved in a wide range of activity to ensure that the hydraulic systems are robust and will deliver the power and the control required to provide optimum performance.

We believe the team have the sailing experience and design knowledge to go all the way and bring the Cup back to New Zealand.

Go... Emirates Team New Zealand!

Our dedicated Hydraulink team are ready 24/7 to support Emirates Team New Zealand with whatever is required to have the new boats ready and primed for sailing and racing.

The Emirates Team New Zealand shore crew often work through the night and if required our expert team will be on hand for any Hydraulic repairs or modifications.

Hydraulinks network of over 300 24/7 Mobile Service Vans offer on-the-spot repair and replacement of worn or damaged hose assemblies. Hydraulink customers are varied and are involved in a wide range of activities including earth moving, materials handling, transport, forestry, marine, mining, tunneling, agriculture, as well as large industrial and military applications.

1995

Hydraulink has been a supplier of high performance Hydraulics to Emirates Team New Zealand since 1995

2013

Design

Hydraulink
Hose and Fittings



The design challenge

The introduction of “winged cats” to the America’s Cup arena provided a number of challenges for the function and layout of the hydraulic system.

The hydraulic design brief called for compact components given the limited space and fast response times to cater for rapid changes in the boat trim. In addition, the various circuits were required to be supplied from pumps located in both hulls and as well as being controllable from both hulls.

The compact nature of the components, especially the cylinders, along with the expected loads meant that hose types employed needed to be capable of elevated pressures as well as being extra flexible to allow routing within tight confines.

The hose types also had to be capable of matching the precision delivered by the control valves as well as providing reduced pressure drops.

The new AC45 and the AC72 catamaran development, along with fixed wing technology is a major leap forward into the unknown. Replacing main sails with fixed-wing technology really stretches the envelope. Sailing speeds have gone from around 15 knots (28km/ph) to 40 knots (75km/ph) and the resulting force loads. Trimming of an aircraft wing is now the application rather than trimming sails. Overpowering the boat is really easy and if the crew are not quickly adjusting then there are catastrophic results. A lot of testing is being commenced on the smaller AC45 catamarans, and then the big step up from July 2012 on the AC72.

High technical specifications required

The same lightweight hose and fittings technology used in the “mono hull” AC boats is required although the performance specs have been significantly increased.

To meet the requirements of the hydraulics design brief a new generation of Thermoplastic hose types has been used. The hose types have hi-tech construction features such as;

- PA6 or Polyethylene tubes
- Aramid reinforcing
- Polyurethane covers
- Reduced bend radius

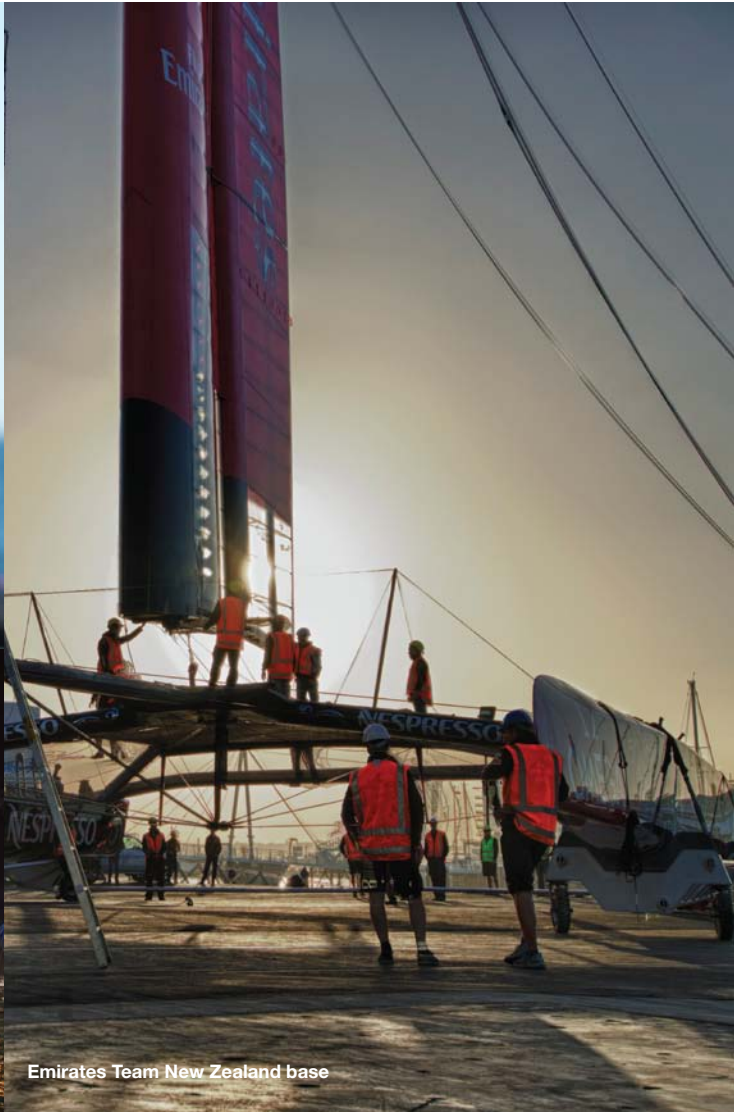
This construction gives enhanced performance capabilities such as;

- High pressure, up to 700bar plus
- Ultra flexibility
- Low volumetric expansion for fast response and precision
- Low friction liners for reduced pressure loss and fast response time





Crew member Ray Davies in action.



Emirates Team New Zealand base



The official launch celebration



Sailing on the Hauraki Golf

AC72 design

The Emirates Team New Zealand design team started on the AC72 project towards the end of 2010. Now, even with a yacht sailing, the process continues into the build of the second yacht and beyond.

The AC72 is totally new. Few components can be bought off the shelf. Over the past 18 months, more than 1000 parts have been designed and engineered from scratch.

The design team spans a wide range of disciplines including designers and engineers who specialise in hydraulic control systems and those who develop complex electronic systems.

Whatever their area of expertise they work together and with team suppliers to create a yacht that can be sailed efficiently, fast and safely.

AC72 vital statistics

Overall length of hulls	22m
Beam	14m
Draft	4.4m
Wing height	40m (from waterline)
Boat Weight	between 5700-5900kg
Crew	11
Crew weight	between 957-1012kg (average 87-92kg)

America's Cup 2013 racing programme

The America's Cup racing programme for next year has been finalised. Organisers in San Francisco plan up to 55 days of racing will be in the Louis Vuitton Cup, America's Cup match and the Youth America's Cup.

The Louis Vuitton Cup challenger series, where challengers race for the right to meet the defender in the America's Cup match, will take place from July 4 to September 1 2013.

Organisers say four challengers have been confirmed: Emirates Team New Zealand, Artemis Racing (Sweden), Luna Rossa Challenge (Italy) and Team Korea.

Oracle Racing will hold defender trials on the same course and on the same days as the Louis Vuitton Cup challengers race.

James Spithill will helm one of the boats, while Ben Ainslie, a member of Emirates Team New Zealand for the 2007 America's Cup campaign, will helm the other.

The America's Cup match, with Oracle racing against the winner of the Louis Vuitton Cup, will run from September 7 to September 22, two races will be held each day with nine wins required to win the America's Cup.

In between the Louis Vuitton Cup and America's Cup Finals the Youth America's Cup will be raced over four days.

The first Cup racing in San Francisco will take place later this month with the first event of the 2012-13 AC World Series from August 21-26.

2013 America's Cup Teams

DEFENDER

ORACLE RACING

Yacht Club: Golden Gate Yacht Club

Cup history: Founded in 2000: Cup challenger in 2003, 2007; America's Cup winner 2010

Team heads: Russell Coutts, CEO: Larry Ellison, team principal

Skipper: James Spithill

Design head: A team of design directors including Dirk Kramers and Mario Caponnetto

Hull construction: Oracle (San Francisco)

ACWS 2011-12: 1st overall (1st fleet racing)

Interesting fact: Coutts is undefeated, 14-0, in Americas Cup races, and has won the Auld Mug four times for three nations (NZ, Switzerland, USA)

CHALLENGERS

ARTEMIS RACING

Challenger of Record

Yacht Club: Kungliga Svenska Segel Sällskapet (the Royal Swedish Yacht Club)

Cup history: First challenge

Team head: Paul Cayard, CEO

Skipper/helmsman: Terry Hutchinson

Design: Juan Kouyoumdjian, principal designer

Hull construction: King marine

ACWS 2011-12: 3rd overall (1st match-racing)

EMIRATES TEAM NEW ZEALAND

Yacht Club: Royal New Zealand yacht Squadron

Cup history: Challenger 1986-1995 and 2007; Defender 2003. America's Cup winner 1995, 2000

Team head: Grant Dalton, managing director

Skipper/helmsman: Dean Barker

Design head: Nick Holroyd, technical director

Hull construction: Cookson Boats

ACWS 2011-12: 2nd overall

LUNA ROSSA

Yacht Club: Circolo della Vela Sicilia

Cup history: Challenger 1999-2007

Team head: Patrizio Bertelli, team principal

Skipper: Max Sirena

Helmsman: Paul Campbell-James/Chris Draper

Design: A team co-ordinated by Roberto Biscontini and Matteo Plazzi

Hull construction: Morrelli and Melvin

ACWS 2011-12: 7th overall (only sailed three events)

Interesting fact: Luna Rossa's boat will be a copy of Team NZ's first AC72; all components bar the hulls will be built in New Zealand

TEAM KOREA

Yacht Club: Sail Korea Yacht Club

Cup history: First Challenge

Team head: Kim Dong-Young, CEO

Skipper/helmsman: Nathan Outteridge

Design: Brett Bakewell-White, design and technical director

Hull construction: unknown

ACWS 2011-12: 6th overall

Interesting fact: Kiwi Brett Bakewell-White's involvement with Team Korea's White Tiger Challenge began in 2007 with the design and build of the KM36 match-race fleet for the Korea Match Cup

New Cup boat AC72 design

Since 1995 Hydraulink has supplied all hydraulic's for the Emirates Team New Zealand boats

The America's Cup has pioneered yacht design for 159 years. In the 34th America's Cup the best sailors in the world will meet their ultimate match; the fastest course racing boat in the world.

Technology returns to the fore with the AC72 wingsail America's Cup catamaran, capable of regularly exceeding speeds of 30 knots. The AC72 will excite fans as it zips around the racecourse with one hull in the air. Equally important, it will leave the crews exhilarated and drained after a day of adrenaline-fueled racing. Crucial to the new boat is its ability to be raced hard in light and strong winds, a necessary development to do away with the frustrating delays of racing because of not enough wind or too much. Fast to grab and retain the attention of a new audience, it also had to be technically stimulating to design and physically demanding for the crew to sail. There will only be 11 crew members, six fewer than the heavy-displacement ACC mono hull it replaces.

"The AC72 Class adds a new dimension to America's Cup design and technology," said Pete Melvin, a chief architect of the rule and champion multihull sailor. "The AC72 will place exacting demands on the helmsman, crew and support team that the vast majority of us who call ourselves 'weekend racers' could never hope to develop".

The new class of America's Cup catamaran is a tightly defined "box rule". Certain parameters have been set, such as overall length, beam, displacement and sail area. Other factors are limited to keep the competition close across all wind speeds.

So that no team would have an unfair advantage by creating the rule, US SAILING and Morrelli & Melvin Design & Engineering authored the rule.

"Near the beginning of the process we were requested to look at a catamaran instead of a trimaran because it's easier to transport, assemble and disassemble," Melvin said.

"The difference in the performance characteristics is not significant, and a cat was judged less expensive to build. From there, the experience of two America's Cups in which wingsails were used (1988 and 2010), coupled with the latest developments in wingsail technology, made it natural to morph the design rule into a catamaran

with a wingsail," said Melvin. The catamaran will be able to fly a hull in 5 to 6 knots true wind-speed. The target boat speeds in winds under 10 knots were set at 1.2 times the true windspeed upwind and 1.6 times true windspeed downwind.

High speeds are derived from enormous power. The AC72 has a righting moment of approximately 55-ton-meters. Determining the sail plan dimensions was difficult because the boat has to be powerful in light winds and not overpowered in stronger winds. "It's been challenging to have the cat fully powered-up and flying a hull in light winds, yet also able to sail in 30 knots," Melvin said. "We put a lot of time and effort into sizing the wingsail and the platform dimensions in order to sail in that full range."

The height of the wingsail will be approximately 40 metres (130 feet) with a maximum chord length between 10 and 11 metres (32 and 36 feet). With such a wide boat, additional structure has been required to optimise the longitudinal stiffness of the AC72 to dampen flexing and to resist the high forestay loads. A draft of the AC72 Rule has been completed and the final rule will be issued by September 30.

Other highlights of the new class:

- Ease of assembly: The AC72 can be assembled in two days and disassembled in one to accommodate the shipping schedule for the America's Cup World Series events.
- Platform configuration: Either a conventional layout catamaran, one with cockpits and helmsman stations in both hulls, or teams will have an option of designing a central pod to centralise all the wing and sail-handling controls.
- Wingsail or soft sails: The AC72 class rule allows for wingsail and soft sail options to promote racing through a broad range of conditions.
- Power source: Engines are banned but electrically driven valves to control the wingsail are permitted.
- Rudders and daggerboards: The rule limits a maximum of four underwater appendages, two rudders and two daggerboards.

- Construction materials and methods: Limits on high-modulus carbon-fibre have been put in place for hull construction. The class rule outlines a minimum outside skin weight of 600 grams per square metre, similar to other racing boats of that size. Core materials may either be foam or honeycomb. High-modulus carbon will be allowed in the wing sail, to add stiffness and strength.

- Cameramen are onboard during racing.

(This AC72 boat design specification information has been sourced from the america's cup challenge website)

