



WB-Sails Ltd

Mikko Brummer



The Problem.

David vs. Goliaths

Small, independent sailmaker in competition with large, multinational “chains”



The Solution.

Big Victories are all about

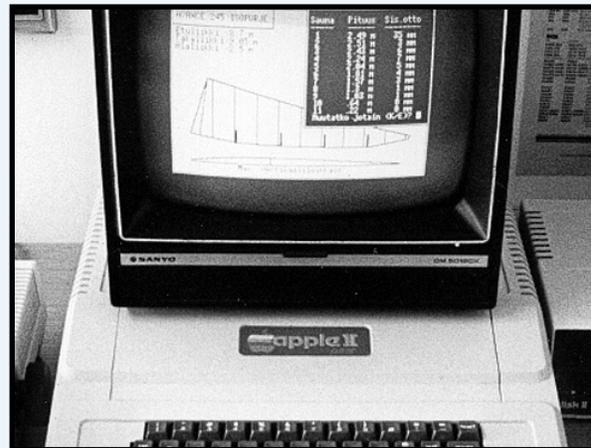
Small Details.



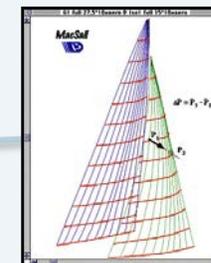
The Innovation.

Innovation through a scientific approach

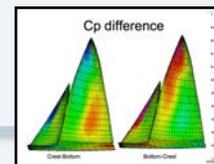
Since 1975, on the the cutting edge of science driven development.



1979 - Apple II



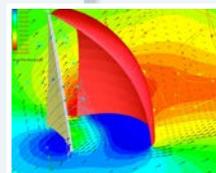
1989 - MacPaint



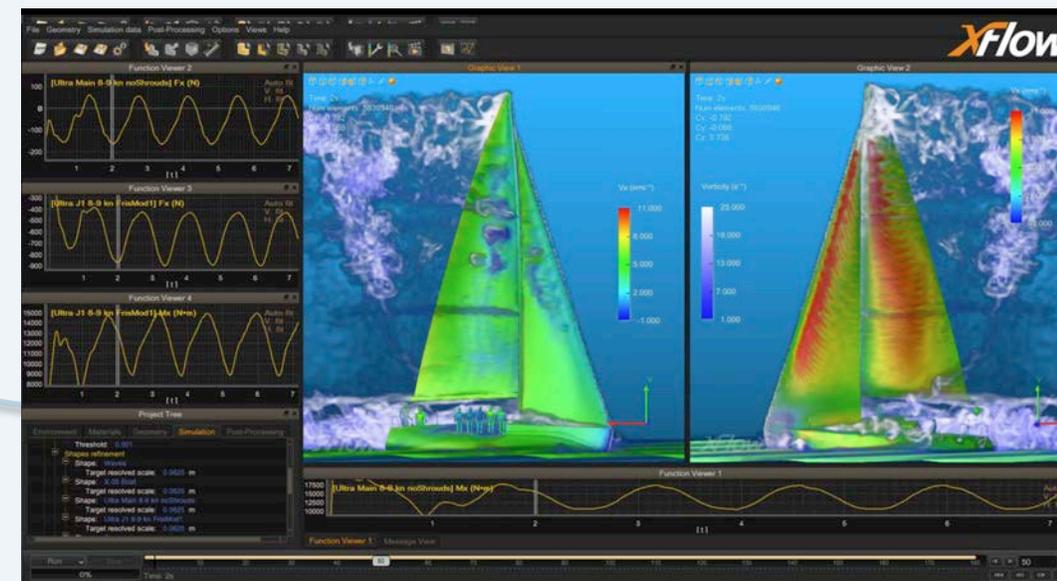
1995 - PMARC



1990 - VPP



2005 - RANS



2011 - XFlow

The Cases.

Mast development for the Finn class with Dassault

Tests in La Rochelle to measure and analyse the Finn mast bending and dynamics.

- In real-time, while sailing



The Cases.

Mast development for the Finn class with Dassault

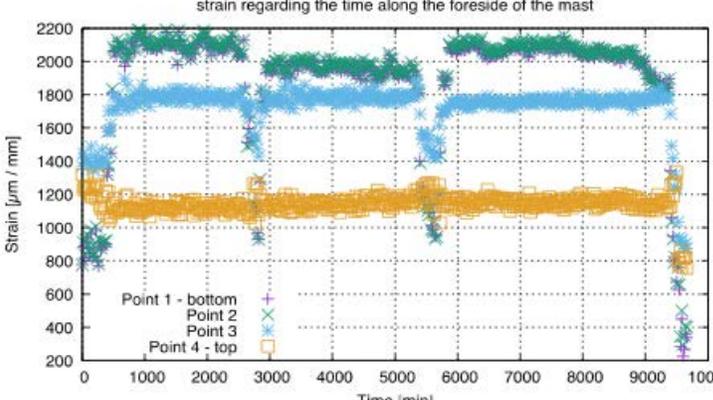
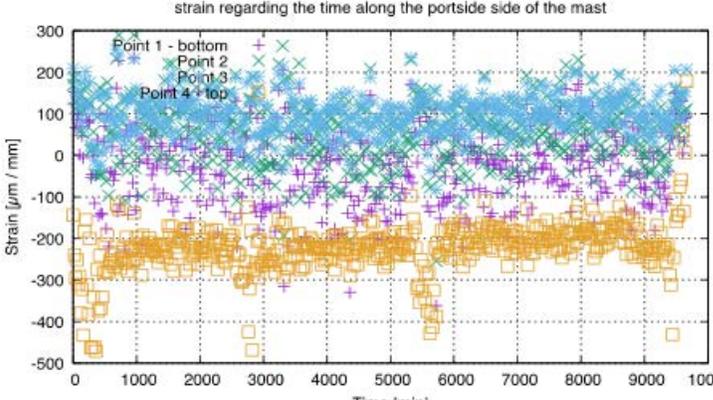
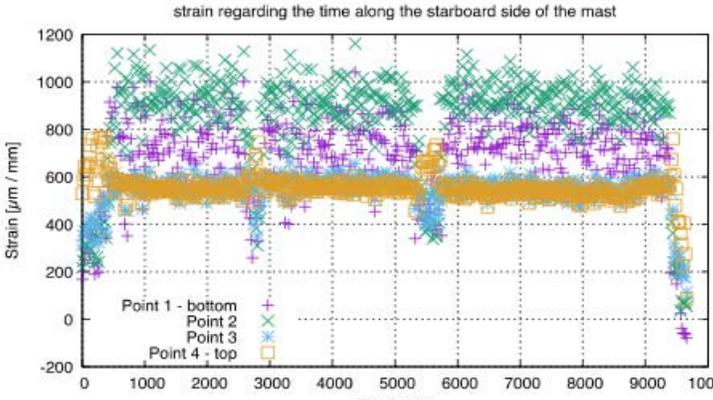
- With fibre optics glued to the mast
- Sail shape and boat attitude monitored by three video cameras and GPS/IMU.

In co-operation with *Dassault Systèmes* (software & data analysis), *Pixel Sur Mer* (fibre optics), ENSV and *Jonathan Lobert* (human sensor).



Sensitivity on Outhaul

The following information were monitored:

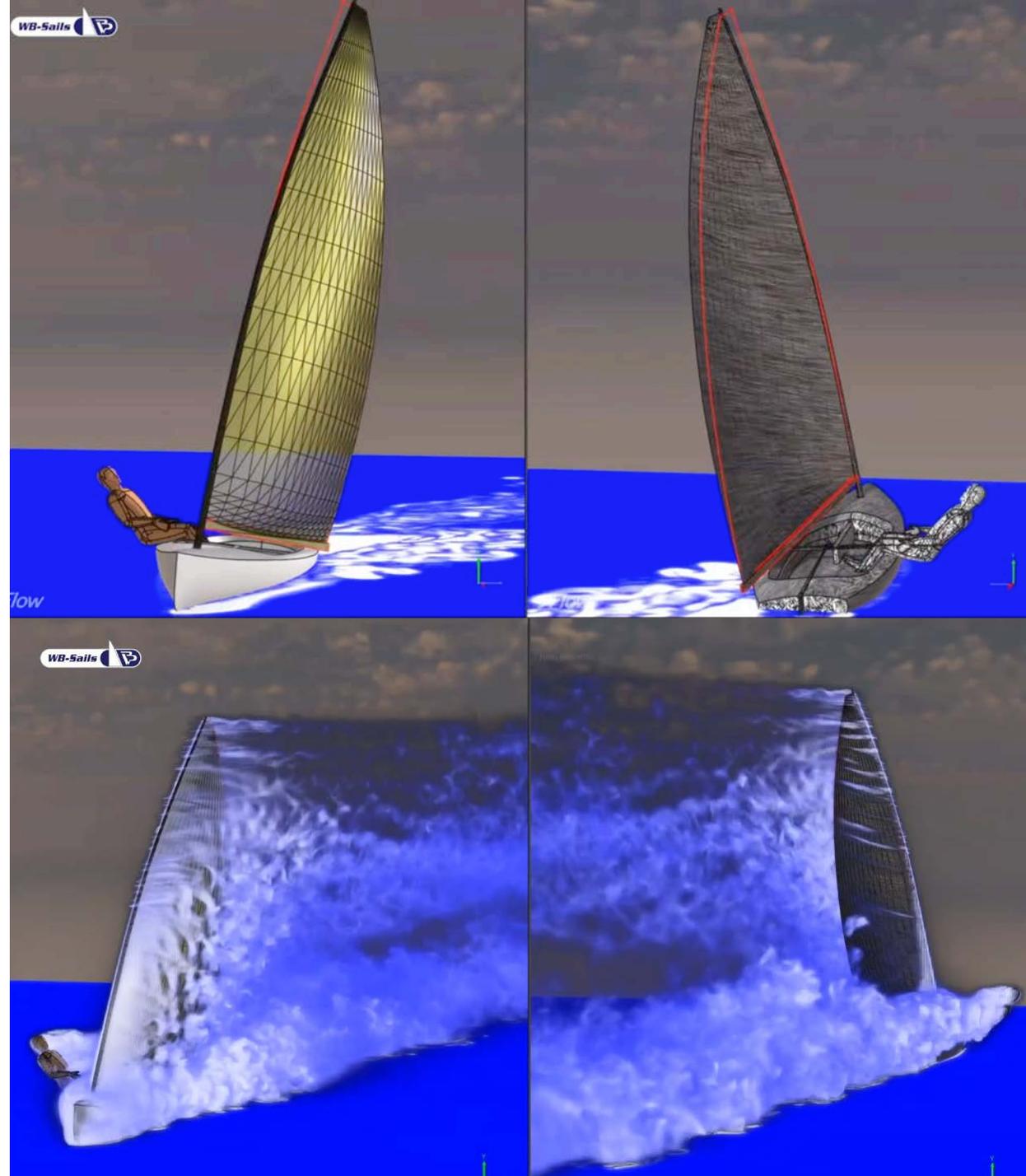
Strain monitoring	Damping at the point
<p>strain regarding the time along the foreside of the mast</p> 	<p>Foreside strains per sensor:</p> <ul style="list-style-type: none"> - S1: 2100/2000/2100 µm/mm - S2: 2100/2000/2100 µm/mm - S3: 1900 µm/mm - S4: 1100 µm/mm
<p>strain regarding the time along the portside side of the mast</p> 	<p>Portside strains per sensor:</p> <ul style="list-style-type: none"> - S1: -100 µm/mm - S2: 50 µm/mm - S3: 100 µm/mm - S4: -250 µm/mm
<p>strain regarding the time along the starboard side of the mast</p> 	<p>Starboard strains per sensor:</p> <ul style="list-style-type: none"> - S1: 900 µm/mm - S2: 700 µm/mm - S3: 600 µm/mm - S4: 500 µm/mm

The Cases.

Aerodynamics of sailing in waves

Enforced boat motions in 6-Dof, with morphing geometry of mast and sail.

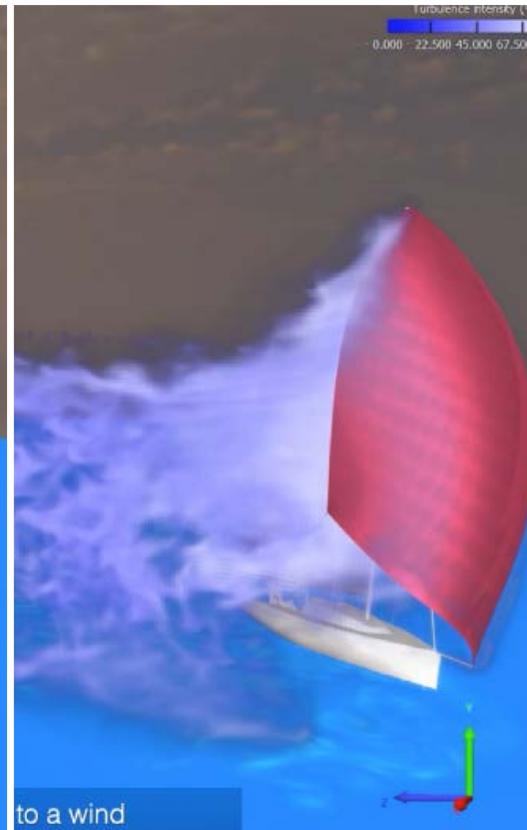
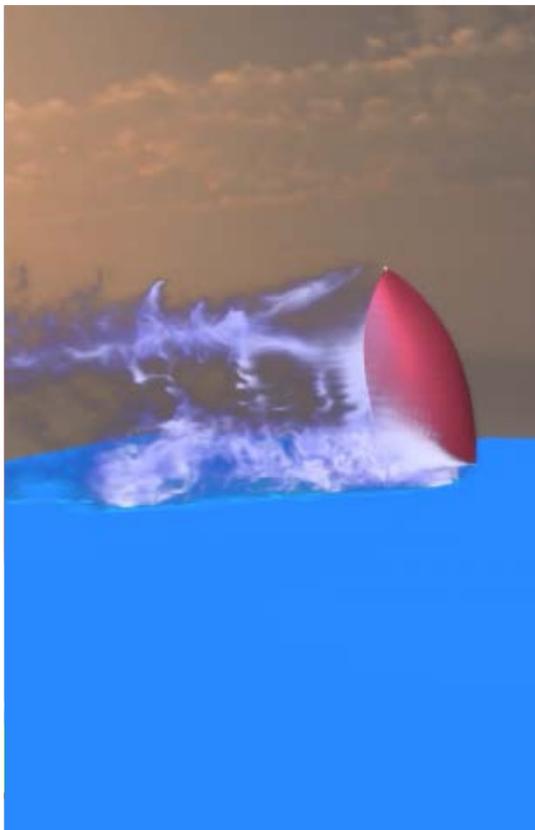
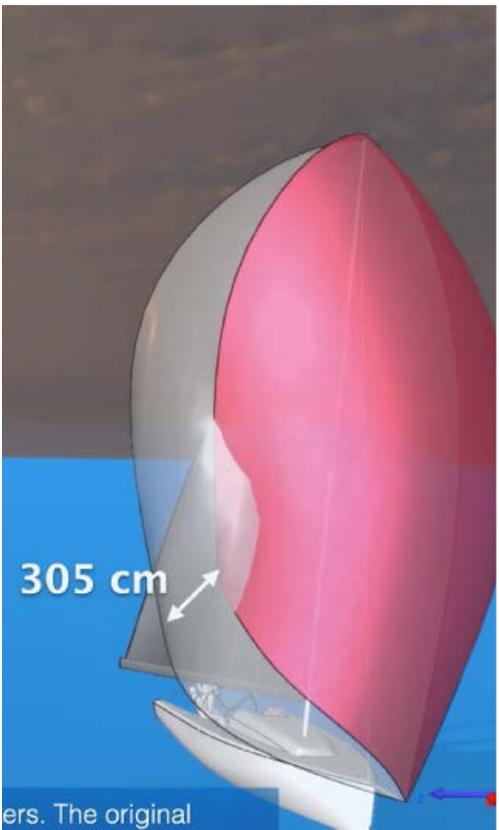
- Heeling moment variation cut down to less than half
- Virtually no effect on average drive



The Cases.

Simulating bear away at mark

Easing the sheet, morphing gennaker shape, with boat moving in true wind field, building its apparent wind.



The Team.

**300 Years Of Experience.
And Curiosity.**



The Horizon.

No monopolies, more collaboration

- New challenges – designing sails for all Olympic classes
- Increasing exchange between the private sector and research institutes/universities



Contact.

Thank you!

- Email mikko@wb-sails.fi
- Website www.wb-sails-fi
- Simulations on our [Youtube channel](#)
- Some articles on [Researchgate](#)

