Sports Engineering

WOLFSON UNIT
FOR MARINE TECHNOLOGY & INDUSTRIAL AERODYNAMICS

BACKGROUND

The Wolfson Unit has been working in the field of experimental testing technology for over 40 years. It has an established reputation in the areas of hydrodynamic and aerodynamic testing. This experience has been used in a range of activities, from the development of America's Cup and other racing yachts and the design of powered marine vessels, to improving air flow around structures and optimising drag and down force in race cars.

Emirates New Zealand Challenge for the America's Cup

In recent years, the Wolfson Unit has been using this experience and developing into the area of Sports Engineering, where customers are asking similar questions and need the same high levels of expertise to solve their problems. These efforts in the Sports Engineering field have led to the Unit being made a UK Sport Innovation Partner.

All work is carried out in secure conditions and full confidentiality is maintained at all times. No details of, or results from, any test programme are ever published without the express permission of the client. The commercial and confidential nature of our business means that only an indication of the range of activities that the Wolfson Unit conducts can be presented. The engineers have experience and a proven track record in innovative research and development of testing procedures and techniques.

The Wolfson Unit specialises in sports areas where there is a significant influence from aerodynamic and/or hydrodynamic forces. This necessitates the use of experimental facilities such as wind tunnels and towing tanks. The engineers also conduct theoretical work and software development, directly for clients and also for commercial release; one such example is our velocity performance prediction tool for yachts, multi-hulls and dinghies, which has a world wide customer base.

Stroke monitoring for flat water canoeing

uk sport
innovation partner

EXPERIMENTAL TESTS

Experimentation can be applied to all stages of a development programme. Models can be modified quickly and re-tested if new ideas develop or unusual results occur.

The towing tank and wind tunnel are only two of the many types of research facilities available to the designer. By working through the Wolfson Unit, he has access to the wide range of academic staff within the University specialising in such disciplines as computational fluid dynamics, aerodynamics, electronics, materials and structures. Wolfson Unit engineers have experience of working in facilities all around the world, which allows the most effective solution to be found for the clients requirements.

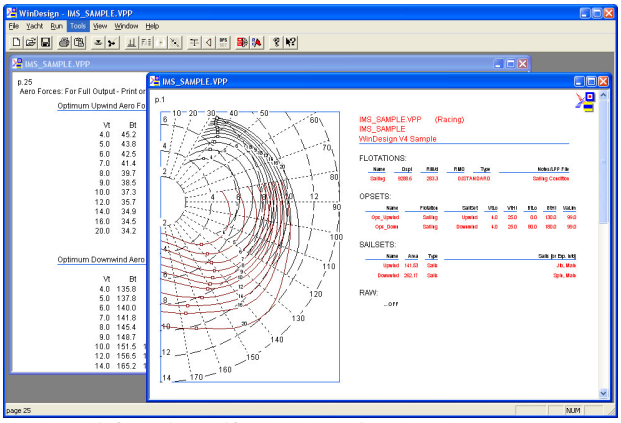
COMPUTATIONAL TESTS

The Wolfson Unit's range of consultancy services encompass Computational Fluid Dynamics (CFD), as well as experimentally based methods. Working closely with a number of partners ranging from academics at the University of Southampton to commercial software vendors and specialist CFD analysts the Wolfson Unit has developed its CFD capabilities in order to compliment the experimental testing and other services we provide.

Wolfson Unit engineers have had experience of, and been using, CFD since the early 1990's. This experience ranges from having conducted academic research to assisting designers on best practice to incorporate CFD within their design development, and using a variety of CFD codes to evaluate fluid flow in a variety of problems. Any results obtained by CFD should ideally be used in conjunction with experimental data, with the experimental data providing the overall forces and the CFD providing an accurate breakdown and distribution of the forces, as well as giving greater understanding of the flow features and any trends to the data.

SOFTWARE

The Wolfson Unit has a range of commercially available software for the marine market, but also write custom software for clients in a confidential and professional environment, to specific deadlines. Recent clients of custom software have been renewable energy companies, offshore safety authorities and national governing body of sports associations.



Screen grab from the Wolfson Unit's yacht VPP, WinDesign

Wolfson Unit MTIA, University of Southampton, Southampton SO17 1BJ, UK
Tel: +44 (0)23 80585044 Fax: +44 (0)23 80671532
Email: wumtia@soton.ac.uk Website: www.wolfsonunit.com

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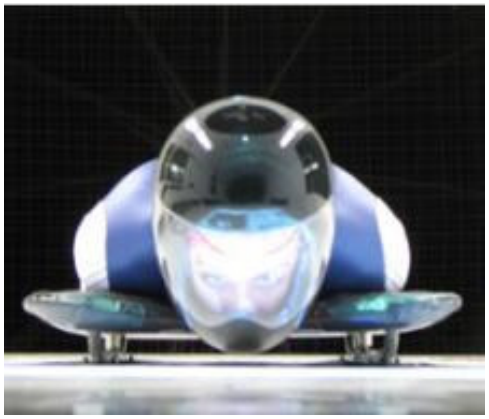
FULL SCALE TRIALS

The Wolfson Unit is able to specify and execute a wide range of full scale experiments, either using its own portable data acquisition system, or linking to existing software and hardware. Wolfson Unit engineers can design and operate a package of instrumentation to measure velocities and accelerations, loads, pressures or any other parameters of interest. High speed video capabilities, linked with instrumentation packages, can provide valuable data, allowing both athlete and equipment development in the real world environment

PERFORMANCE EVALUATION

Often the key link between the gathering of test data and developing a better product from it is an accurate and reliable performance evaluation method. This can either be a computer program, such as a yacht velocity prediction program or a more subjective criteria, involving athlete input. Wolfson Unit engineers are accustomed to designing, evaluating and using a wide range of performance evaluation tools.



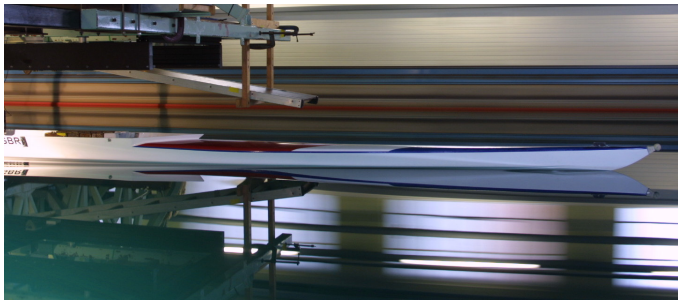
Testing for the British Bob Skeleton Association in University of Southampton Wind Tunnel

Definition of the performance trade offs available and rapid assessment of alternative design concepts can be carried out using towing tank and wind tunnel test results combined in a simulation program to define the performance of different designs.

EXPERIMENTAL EQUIPMENT

In most of the facilities used, the experimental data are gathered using Wolfson Unit purpose built dynamometers, whose signal conditioning equipment is linked to a PC based data acquisition system. Routine data analysis and results presentation can be accomplished during the tests.

Our yacht testing dynamometer is the result of over 30 years testing and refinement of the design; as a result the Wolfson Unit has sold the design to a number of towing tank facilities around the world. We have been involved in developing an effective testing environment for the UK track cycling team since 2005.



Testing of rowing shells at Haslar QinetiQ towing tank

Olympic medallist Jason Queally in the wind tunnel

PROGRAMME MANAGEMENT

With our experience of Americas Cup, round the world racing yacht campaigns, and as a UK Sport Innovation partner, the Wolfson Unit is accustomed to managing large budget, long time scale research and development programmes. Understanding of specific deadlines and milestones for both commercial and private clients has allowed us to repeatedly deliver detailed goals.

PROBLEM SOLVING

We often become involved in projects as part of a team, taking existing equipment, and analysing it's current performance. From this we can determined whether the performance can be improved in its current state, and participate in its re-design and optimisation, using a range of tools such as theoretical, computation and experimental. This leads to the selection of the most suitable equipment for the sport and environment.

Typical problems that the Wolfson Unit have assisted with are :

- Equipment selection (e.g. helmets, paddles)
- Athlete efficiency studies
- Testing methodology and trouble shooting

FACILITIES

The Wolfson Unit is happy to operate in a facility of the clients choice, but facilities we have regular access to include:

Small towing tank at Southampton Solent University

60m x 3.7m x 1.8m deep. Maximum carriage speed 4.5m/s. Wavemaker capable of seastates to 0.2m significant height.

Large towing tank at QinetiQ Haslar

258m X 12.2m x 5.5m deep. Maximum carriage speed: 9m/s. Wavemaker capable of seastates to 0.3m significant height.

Ocean basin at QinetiQ Haslar

120m x 60m x 5.5m deep. Wavemaker capable of seastates to 0.3m significant height. Suitable for manoeuvring and seakeeping tests of self

Circulating water channel at QinetiQ Haslar

3m x 1.7m x 0.8m deep. Maximum water speed: 6m/s. Suitable for flow visualization. Adjustable floor for shallow water studies.

Wind tunnel No.1 at University of Southampton

Working section: 2.1m wide x 1.5m high x 4.4m long. Maximum wind speed: 50m/s. 3 component balance in tunnel roof. Moving ground belt.

Wind tunnel No.2 at University of Southampton

3.5m wide x 2.6m high X 10.5m long. Maximum wind speed: 55m/s. 6 component balance and turntable in tunnel roof. Moving ground belt.

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