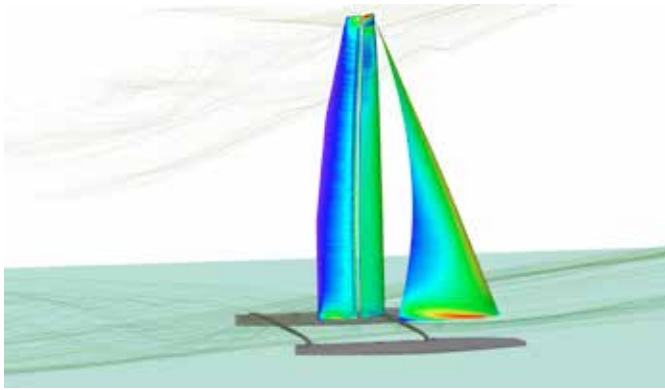


## Background

The Wolfson Unit's range of consultancy services encompasses Computational Fluid Dynamics (CFD) as well as experimental methods. Wolfson Unit engineers have been using CFD since the early 1990's; working closely with a number of partners, ranging from academics at the University of Southampton to commercial software vendors and specialist CFD analysts, we have developed our CFD capabilities to compliment the experimental testing and other services we provide. Our experience ranges from our core service of using CFD to solve engineering problems to assisting designers on best practice incorporating CFD within their design development.



Aerodynamic performance study of down wind sails - North Sails

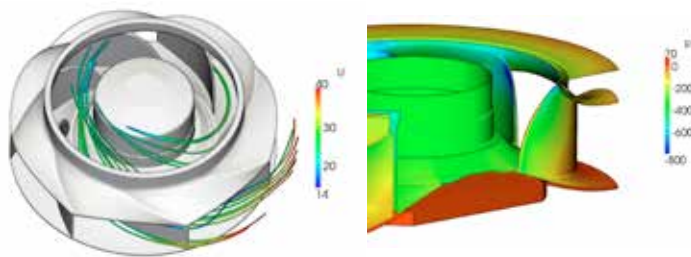
## CFD capability

Using the open source OpenFOAM® CFD Toolbox CFD solver on the University of Southampton's latest supercomputer, Iridis 4, allows us to provide a fast turnaround on a full matrix of simulations of detailed models. Our computational methods are validated against the large historical database of experimental testing that the Wolfson Unit have conducted, hence we are well placed to offer high quality results built on validated methods.

As well as using the Iridis computational resource for undertaking our own consultancy services, the Wolfson Unit has the capability of providing a portal to the supercomputer for clients to run their own simulations.

The technical specifications of the Iridis 4 machine are -

- 12200 processor cores providing 250 TFlops
- At least 4GB of memory per processor core, typical jobs running on 64 processors can thus use 256GB RAM.
- currently ~1.04 PB of usable disk space
- Infiniband network throughout



Aerodynamic performance study of a centrifugal fan

## Aerodynamic Studies

Modelling capabilities include unsteady and twisted flow, as well as state-of-the-art prediction of turbulent behavior (using Detached Eddy Simulation, or DES), allowing accurate evaluation of aerodynamic forces and flow-paths.

Typical studies that can be conducted include:

- Aerodynamic efficiency of sails and wings
- Performance prediction of sails in unsteady conditions
- Prediction of aerodynamic forces on superstructures
- Forces and flow around structures
- Renewable Energy Device optimisation
- Vortex Induced Vibrations (VIVs)
- Heli-deck environment studies



Aerodynamic flow over a balloon launch building for the MET Office - DES Simulation

## Visualisation of Results

One of the main benefits of CFD is the ability to visualize flow characteristics around an object and the pressure or skin-friction distribution acting upon it. For our unsteady analyses we can also provide animations of the flow behavior. We have regularly seen the benefit our clients have had from this in improving the understanding of their designs.



Aerodynamic study of a motor yacht helideck - DeVoogt Naval Architects