



# Water to Wire Modelling Services

The risks associated with the development of a large scale tidal energy device can be mitigated by a detailed understanding of the environment, loading and performance of the converter. Modelling these variables simultaneously provides the most realistic output. Water to wire numerical modelling provides a low risk method to achieve this and enable the comprehensive testing of multiple combinations of load and performance scenarios.

Through our combined commercial and R&D modelling approach, IT Power and Fraunhofer IWES can offer a range of simulation models for tidal current turbines depending on your requirements; from the simplest Blade Element Momentum (BEM) rotor models to full system, water to wire models to determine loads and performance.

## BLADE TO GRID MODELS:

**ROTOR MODELS:** Blade Element Momentum (BEM) based rotor models to calculate conversion performance and dynamic, fatigue and extreme loads.

**STRUCTURAL DESIGN:** Foundation and mooring design for both fixed and floating devices.

**HYDRODYNAMIC MODELLING:** 3-dimensional inflow current field simulation including "Wave Current Interaction" (WCI) and turbulences.

**POWER TAKE OFF AND GRID SIMULATION:** Coupled system modelling to simulate behaviour between power capture, generation and transmission. Electrical output with 3-phase voltage and current to evaluate grid interactions.

## LOADS TO CONTROL SYSTEMS:

**LOAD ANALYSIS:** Static and dynamic load calculations with stress and strain simulations. Advanced methods to assess fatigue loads.

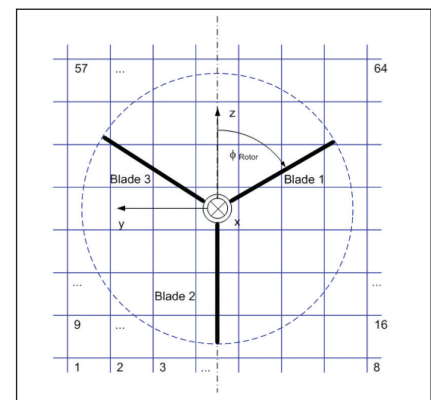
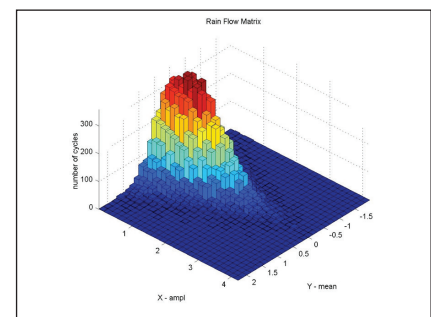
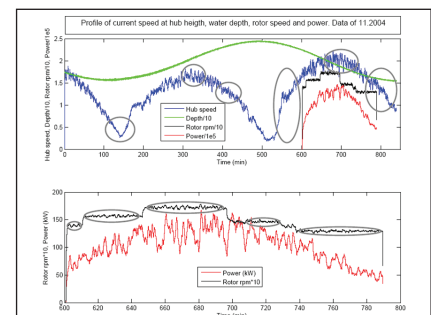
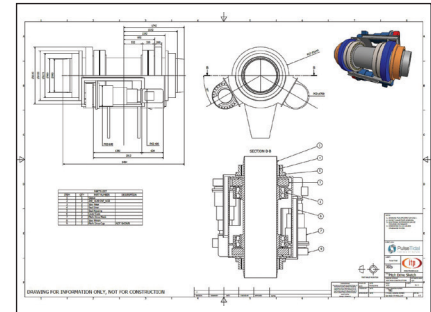
**LOAD REDUCING CONTROL STRATEGIES:** Advanced control algorithm development for reduction of loads on rotational and structural components.

**CONTROL SYSTEMS ENGINEERING:** Machine based operational control to simulate full operational cycles of the tidal turbine. Optimisation of power control with or without blade pitching.

**IMPLEMENTATION OF CONTROL SYSTEMS:** The developed control and operation algorithms can be directly transferred into Programmable Logic Controller (PLCs) as well as into almost any other type of controller hardware (rapid prototyping).

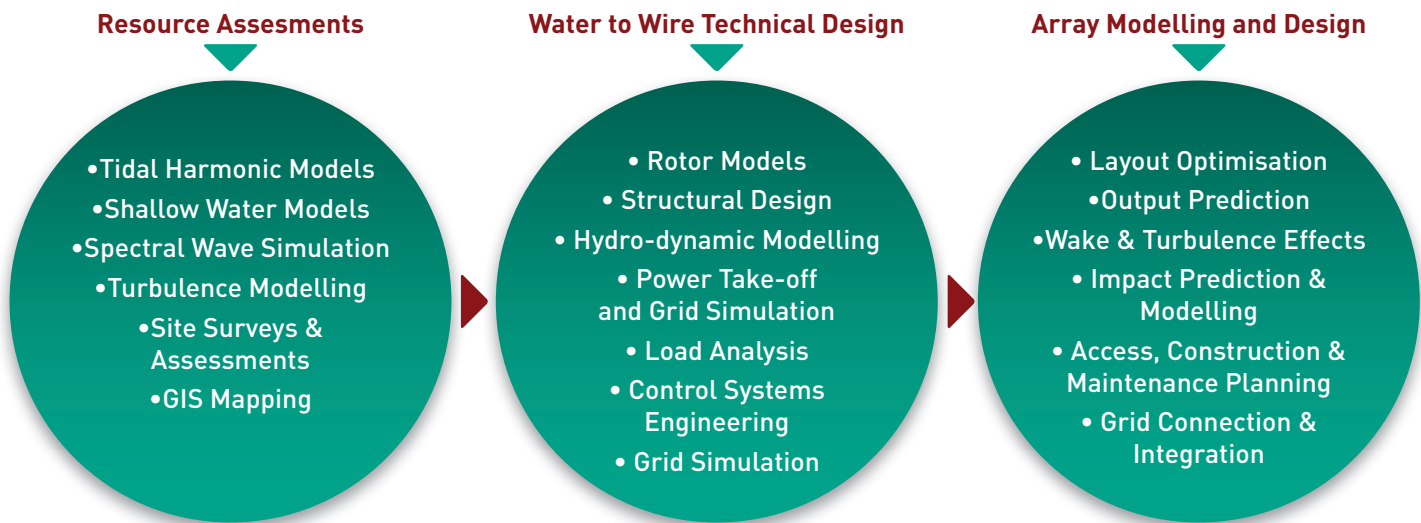
We can calculate large numbers of load cases, run fatigue calculations, investigate numerous design options and optimise the device design. The results deliver high confidence levels for prototype field testing and real machine operation.

We can support your technical development with tailored, bespoke design simulation solutions for part of or the entire development process.



# MARINE ENERGY SIMULATION SOLUTIONS

Our **Water to Wire Modelling Services** form part of our **Simulation Design & Modelling Solutions** that we offer marine energy technology and project developers.



## WHO WE ARE

IT Power has provided independent consulting and engineering support to the marine energy sector since 1992. The Fraunhofer Institute for Wind Energy and Energy System Technology IWES is a world-renowned research and technology development facility. Together, we can provide you with the practical consulting experience and cutting edge research and design resources to deliver success for your technology and projects.

**We have already helped several companies develop full scale demonstration prototypes. Find out how we can help your marine energy development.**

## OUR PARTNERSHIP

The IT Power and Fraunhofer IWES partnership is built on a long standing collaboration between the two organisations that has spanned over 15 years. We have worked cooperatively on over a dozen major reach projects. Our partnership therefore offers you the very best engineering support and technical expertise for your marine energy project development. Our simulation solutions deliver expertise throughout the entire cycle of both technology and project development, from resource assessment, to device evolution and project commissioning.

## ENGINEERING EXPERTS FOR YOUR MARINE TECHNOLOGY SUCCESS

We can provide all of your modelling simulation support and project design services to solidify your place as a marine energy front-runner.

### OUR DEDICATED TEAM OF EXPERTS INCLUDE:

- Mechanical and Electrical Engineers
- Naval Architects
- Hydro-dynamists
- Oceanographers
- Environmental Scientists
- Numerical Modellers

## CONTACT US

To find out how we can provide simulation solutions for your marine energy project, get in touch.



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