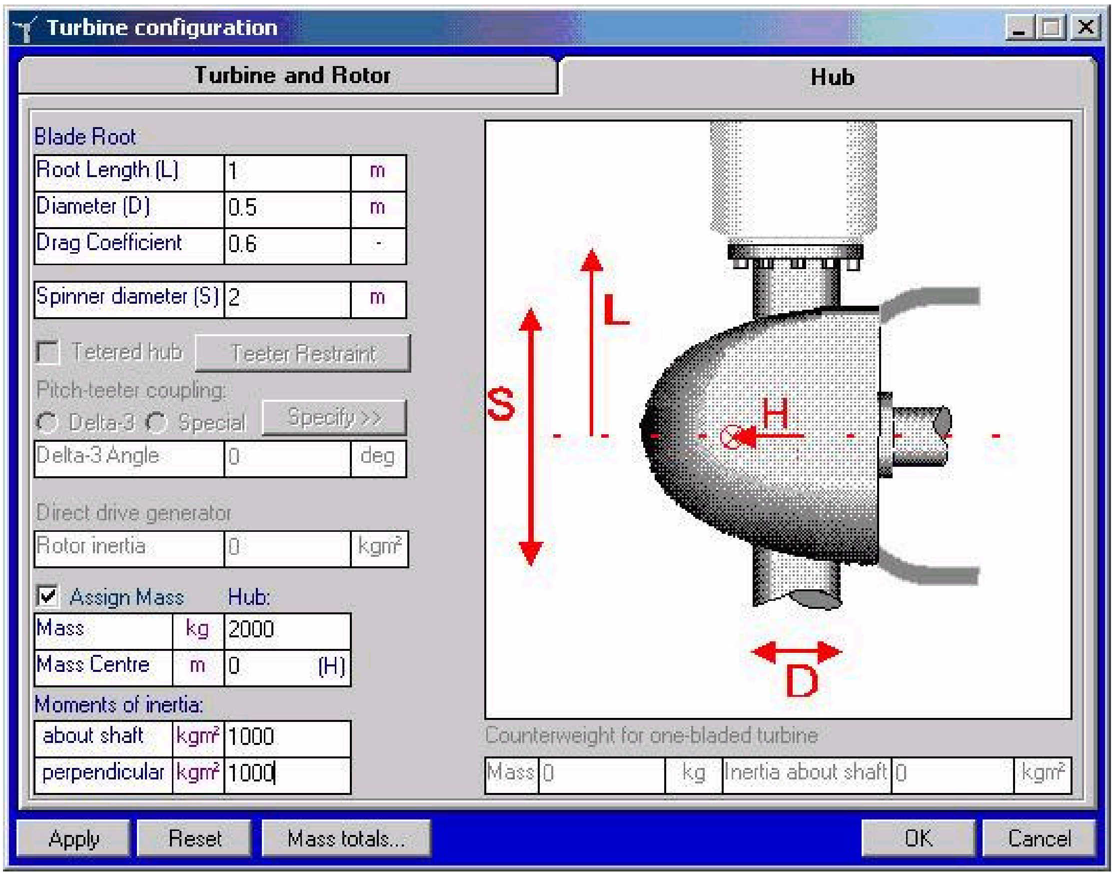
dti

PROJECT PROFILE NO: PP236

Development of a Design Tool for Tidal Current Turbines



Hub data from 'Bladed' input screen

OBJECTIVES

- In consultation with UK industry and academia a comprehensive specification of requirements for a tidal turbine design tool will be developed.
- The development of an existing aeroelastic design tool, Bladed, to adapt and, where required, include new engineering models and user interface software for the design tool to meet the requirements of the industry.
- Validation of the new engineering models using measured data from a prototype tidal current turbine.
- Proving of the new design tool by undertaking design trials and beta testing.
- Final development, documentation and

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dissemination of the design tool and project results.

SUMMARY

In recent years the development of tidal current turbine technology has progressed rapidly to the point where prototype systems have been installed and are now operational. Following the thorough testing and proof of the prototype systems, considerable challenges remain to be tackled in order to move the technology towards commercial viability and provide the confidence required to attract project developers and investors.
The ability to predict rotor behaviour and performance accurately in complex operating environments is an essential element in the commercialisation of this new technology. This project would be an important step in the development of an analysis tool that would allow these complex effects to be modelled.

Over the last twenty years Garrad Hassan (GH) has played a key role in the development of mathematical models which can represent the behaviour of wind turbines. This work has involved fundamental research leading to extensive measurement and model validation activities. It has then been a further challenge to develop the Bladed computer program which offers reliable models of wind turbine behaviour but also provides the quality, robustness and ease of use required by designers. Bladed has become a "wind industry standard", certified by Germanischer Lloyd and used by more than fifty commercial organisations for the design and certification of wind turbines.

Bladed provides an excellent basis for the development of a tidal current turbine design tool. Many of the wind turbine related features and engineering models contained within the software are directly applicable or easily adapted to the axial flow tidal current turbine. Those elements of particular relevance include the modelling of complex turbulent flows upstream of the turbine, the capability to model fluid/structural interaction effects, and the ability to experiment with different control system strategies to optimise performance and reduce fatigue loading.

The development of a tidal current turbine design tool will help to maintain the UK industry's position at the forefront of tidal stream technology development.

CONTRACTOR

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(Contract Number: T/06/00231/00/00)
URN Number: 05/1611

COST

The total cost of this project is £175,000 with the Department of Trade and Industry (DTI) contributing £87,500 and Garrad Hassan & Partners contributing the balance.

DURATION

15 months – 01January 2005 to 31 March 2006.

Further renewable energy information from the DTI Technology Programme: New and Renewable Energy, and copies of publications, can be obtained from:

Renewable Energy Helpline

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SEPTEMBER 2005