

Project proposal template – Faculty studentships Summer 2014

<i>Project title</i>	STRUCTURAL OPTIMIZATION OF HORIZONTAL AXIS COMPOSITE WIND TURBINE BLADES	<i>Director of Study</i>	Dr Homayoun Hadavinia
<i>Second Supervisor</i>	Dr D. Venetsanos	<i>School</i>	Mechanical and Aut ▼
<i>Other members of supervisory team</i>	Mr E. Lewis Professor GH. Liaghat Alan Waggott (NaREC) Christian Little (NaREC)	<i>Any requirements from applicant (eg degree in specific subject area)</i>	- Knowledge of MATLAB and FEA ▲ - MSc or first class BEng/MEng in ▼
Project summary (max 1,000 characters)			
<p>The objective of this project is to develop an optimization methodology for the structural design of horizontal axis wind turbine (HAWT) blades. Various optimisation methods in MATLAB optimisation tool box in conjunction with the finite element ANSYS software will be used. The project outcome will be to create an optimization tool for improvements of HAWT blades by reducing the blade mass and the cost.</p> <p>Various constrained optimization methods such as Genetic Algorithm (GA) with respect to minimum mass of the blade will be used. The design variables will be stacking sequence of layers in the spar cap and shear web and also the positions of the shear webs. The constraints will be chosen from the stress/strain limit, the clearance allowable between the blade and tower, and vibration limit.</p> <p>Sample scaled blade specimens will be designed and built and the structural performance of the optimised blade will be tested in limit static loading and fatigue under extreme flap-wise load conditions.</p> <p>It is anticipated that the developed optimisation methodology will have potential for enterprise development and the new expertise will be incorporated in teaching at UG and PG level.</p>			