



GREAT WESTERN RESEARCH *focus*

Since its inception, Great Western Research [GWR] has set about promoting collaborations between the highest quality research groups and the most forward thinking businesses in the South West in order to support the growth of the region and to demonstrate just what is possible when academics and businesses collaborate. A recent partnership, formed through GWR, between Airbus UK, the University of Bath, the University of Bristol, the University of Exeter and GWR PhD students Peter Giddings and Alberto Pirrero, is focusing on delivering an innovative solution to a very real problem.

Lighter, Stronger Aircraft

Smart materials, which are able to radically change their shape on application of an electric field, represent an emerging leading edge technology which is being developed in the South West of England. Through a partnership between aircraft manufacturer Airbus UK Ltd and the Universities of Bath, Bristol and Exeter, a radical change in the way aircraft wings are built is being developed which aims to significantly reduce the cost of flying.

Currently, the large changes in wing profile necessary during take-off landing and high-altitude flight are generated by complex hydraulic systems within an aircraft's wing. This may not be the best way to proceed in future aircraft design, however, as smart materials could provide interactive shape changes much more efficiently. Without such large hydraulic systems or turbulent airflow over interrupted wing surfaces, significant weight reduction and improved aerodynamics are just two of the advantages of using smart materials as part of aircraft wing design.

Specially designed carbon-fibre wing segments can be changed into different preset configurations, to mimic or improve upon the wing

profiles of current designs, by applying a voltage to piezoelectric actuators embedded in these structures. Using smart materials in wing design could therefore yield real economic and environmental benefits by reducing weight and drag and thus eventual fuel burn and CO2 emissions.

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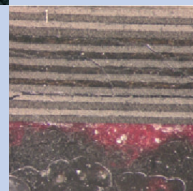
Peter and Alberto's smart materials project has already borne fruit with papers published from presentations at several smart materials and aerospace conferences as well as their participation in an exhibition currently on display in the National Science Museum in London.

This ground breaking research brings together specialist teams in structural composites, non-linear materials and piezo-electrics from Universities around the South West, into one area of focused research. The interaction of such varied disciplines within one topic has been made possible by GWR which provides research funding via a mechanism that



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Prof. David Billington



encourages Universities to collaborate with one another alongside industrial partners.

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The core principle of collaboration behind GWR Studentships has also allowed Peter Giddings and Alberto Pirrero to pursue their focused research into smart materials while providing the opportunity for them to network with academics and researchers with varied expertise within the smart materials community. This meeting of minds through collaboration is a unique benefit of the GWR studentship scheme.

The GWR funding for these PhDs at the University of Bath formed the intellectual basis for a funding grant from the EPSRC for £250,000 to purchase specialist equipment to accelerate the progress of their projects. The equipment purchased has for example enabled Peter to move his work forward dramatically by making use of state of the art imaging technology to automatically measure curvatures and shapes of the prototype structures he is investigating.

With GWR and Airbus jointly sponsoring a total of 8 PhD's working in 4 carefully selected areas of research within composite materials, researchers have been able to bring together novel materials, composites and aerospace groups at

departments in the Universities across the South West. This research cluster involves projects spanning modelling, mechanics, actuators, structures and optimisation studies.

With some promising initial results already established, Airbus have a firm basis for research into the future of smart materials. Potential spin-off ventures into other industries may also be on the cards, with smart materials technology exciting interest in other areas such as fluid flow and valve design.

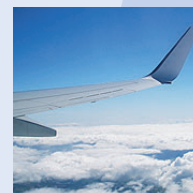
GWR Studentships and Fellowships are stimulating the building of new partnerships with major research funders in the region, and thanks to GWR over £2 million of new public and private investment is being made into research projects in the South West of England.

The inspiration for the GWR concept is simple - “The intention is that it should increase interactions between University research groups and business, and therefore build capacity and attract more money for research,” said Prof. David Billington, Executive Director of GWR - “It is about ensuring the sustainability of internationally excellent research in the South West and preparing the region for the technologies of the future, by investing in collaborative forward looking research programs.”



GWR is a £14m collaborative project which funds 130 PhD Studentships and 20 Research Fellowships at universities in the South West of England

All GWR studentships are real collaborations, each project is 50% funded by GWR and 50% by the business partner



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