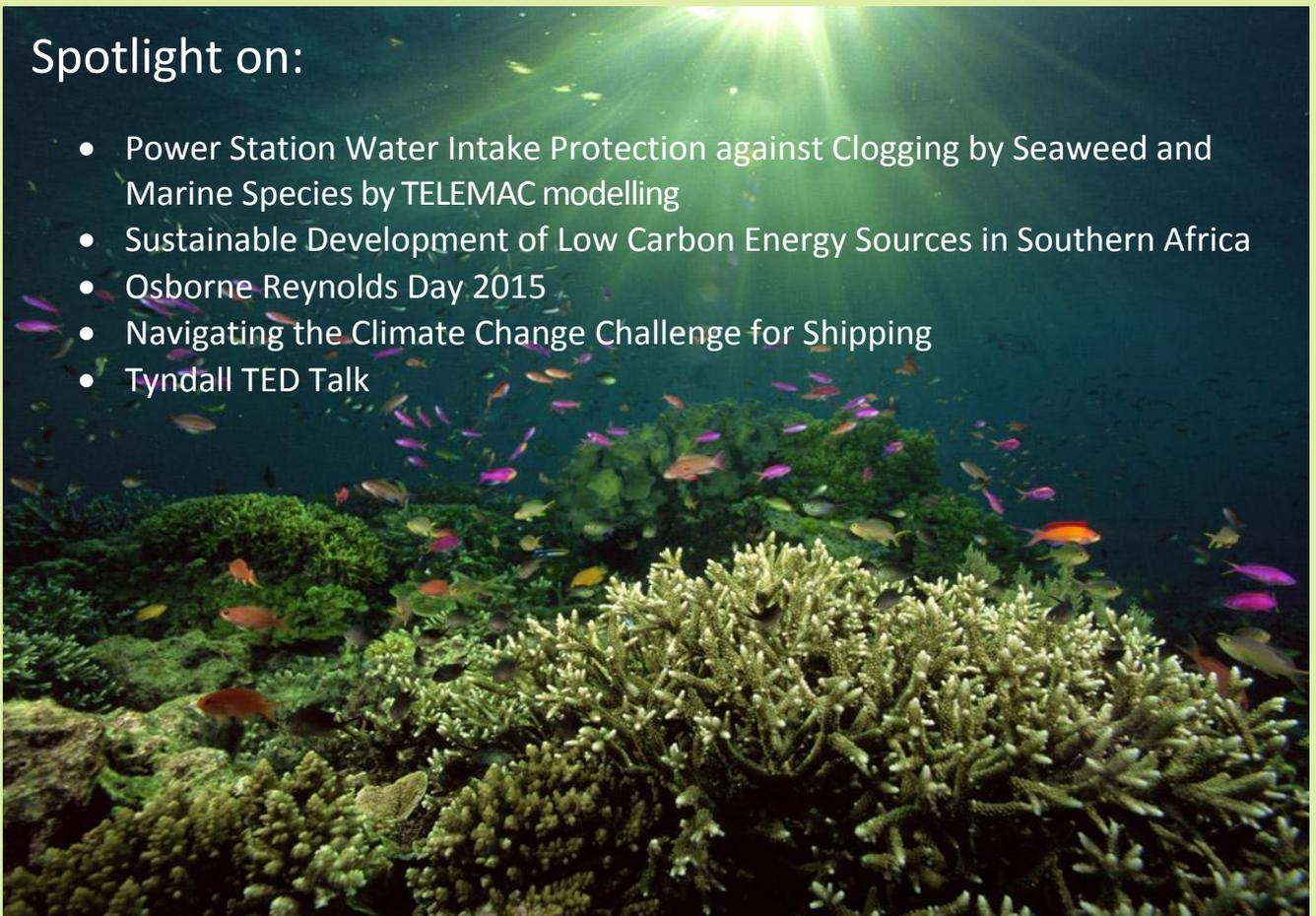


## The School of Mechanical, Aerospace and Civil Engineering

Issue 8 – Autumn 2015

### Spotlight on:

- Power Station Water Intake Protection against Clogging by Seaweed and Marine Species by TELEMAR modelling
- Sustainable Development of Low Carbon Energy Sources in Southern Africa
- Osborne Reynolds Day 2015
- Navigating the Climate Change Challenge for Shipping
- Tyndall TED Talk



### ***In this issue***

Page 2 Editorial by Prof Andrew Gibson and  
Research News

Page 3 Tyndall Manchester

Page 4-5 Grants & Awards

Page 6-7 Impact & Outputs

Page 8 New Appointments

### ***Contact us***

School of Mechanical, Aerospace and Civil Engineering

The University of Manchester

George Begg Building

Manchester, M13 9PL, England

Tel: +44(0)161 306 4545

Email: [researchsupport-eee-mace@manchester.ac.uk](mailto:researchsupport-eee-mace@manchester.ac.uk)

Web: <http://www.mace.manchester.ac.uk/>

# Editorial by the Head of School



This series of research newsletters began in Spring 2011 when the then Head of School, Professor Peter Stansby, introduced the publication by predicting that 'It will be the first of many'. The following year, Peter moved on to become the Director of Research in order to lead the School successfully through the Research Excellence Framework in 2014. Peter is now Deputy Head of School and is immersed in his own research. Regarding the ongoing publication of the newsletter, we should thank our

Research Support Manager, Janine Flanagan, who brings it all together and has done so since the first issue.

Also in that first publication, Peter wrote that 'Engineering is more important now than at any time in my career' and we can see how the Faculty of Engineering and Physical Sciences has grown in the past few years with investment in the National Graphene Institute, the Manchester Engineering Campus, the Graphene Engineering Innovation Centre and the proposed Royce Institute for Advanced Materials. It has been an exciting few years and this will continue into the future as this investment in Manchester Engineering comes to fruition.

Returning to this issue of the newsletter, I am always impressed by the diversity and high quality of research we do in the School of Mechanical, Aerospace and Civil Engineering and the content of this issue does not

disappoint. Inside, we report on a range of projects from the sustainable development of low carbon energy sources in Southern Africa to methods to predict levels of seaweed clogging on power station water intake.

We also report on events such as the Osborne Reynolds Day 2015, hosted by the School, which included distinguished keynote speakers and a competitive event for early career researchers. Six more staff have joined the School and this is further evidence of the investment in engineering at Manchester.

In this newsletter, there are numerous other small pockets of excellence reported which also contribute to the development of the School. I hope that you enjoy the contents and, please remember, all feedback is welcome.

Professor Andrew Gibson

MEng, PhD, DSc, FIET, SMIEEE, FIMechE, C.Eng

## Research News

### Tyndall's TED Global Talk

Imagine the hottest day you've ever experienced ... Now imagine it's six, ten or twelve degrees hotter.

According to [Professor Alice Bows-Larkin](#), that's the type of future in store for us if we don't significantly cut our greenhouse gas emissions now.



© James Duncan Davidson/TED

In her 14 minute TED talk, she suggests that it's time we do things differently - a whole system change, in fact - and seriously consider trading economic growth for climate stability.

The video of the talk is available on the [TED website](#). This has had a remarkable 516,000 views at the time of writing.

### DualSPPhysics Users Workshop

On 8-9 September 2015, [Dr Ben Rogers](#) hosted the 1<sup>st</sup> DualSPPhysics Users Workshop. Using the CUDA programming framework, DualSPPhysics has been developed jointly with the Universidade de Vigo (Spain), the University of Manchester (UK) and collaborators at the University of Parma (Italy), Technical University of Lisbon (Portugal) and Flanders Hydraulics (Belgium).

As an open source and freely available SPH software package, using graphics processing units (GPUs) DualSPPhysics puts the power of mini-supercomputers in the hands of engineers using SPH in industry for potentially violent free-surface flows such as breaking waves, offshore devices including floating wind turbines, impacting jets, gearboxes, fuel tank sloshing, etc. (Crespo *et al.* 2015). On the last day of the workshop Dr Tim Lanfeear from NVIDIA provided an insight into their future strategy of development for acceleration devices such as GPUs (see photo).



### UK Vertical Lift Network



The 1<sup>st</sup> Technical Workshop of the UK Vertical Lift Network took place from April 10<sup>th</sup> to 12<sup>th</sup> of April at the beautiful setting of Nunsmere Hall in rural Cheshire.

The event was the first in a series planned by the UKVLN as part of the EPSRC network grant jointly held between the Universities of Manchester and Liverpool.

The objective of the event was to take a snapshot of active research within the UK in areas related to helicopters and vertical lift vehicles. The event, hosted by [Dr Antonino Filippone](#) and [Dr Nicholas Bojdo](#), was attended by more than 20 delegates presenting 14 technical papers covering aerodynamics and CFD, helicopter power-plant modelling, flight simulation and flight operations, rotorcraft dynamics and rotorcraft safety.

### Educational Tools for Flying Unmanned Air Vehicles

From July until September 2015, Dr Ben Parslew undertook a research placement at King Mongkut's University of Technology Thonburi in Bangkok. He was based in the [Institute of Field Robotics \(FIBO\)](#), where he conducted a project on Unmanned Air Vehicle Education.

This research was funded with support from the British Council Newton Fund: Research Links Travel Grant.

**You can read more about this project on page 5**

Find out more about Dr Parslew's research on:

<http://www.manchester.ac.uk/research/ben.parslew/research>



## Sustainable development of low carbon energy sources in Southern Africa

Bioenergy experts from the School of MACE have been supporting sustainable development of low carbon energy sources in Southern Africa, as momentum gathers pace around South Africa's transition from a coal-dominated, high carbon energy system to renewable alternatives.

In 2014 Prof Patricia Thornley ran a British Council workshop on Bioenergy with over 20 UK and South African early career researchers. This focused particularly on the challenges of implementing sustainable bioenergy systems that delivered genuine greenhouse gas reductions. Since then the group has run a UK seminar on bioenergy in the global south and published a research prospectus for bioenergy in Sub-Saharan Africa.

This summer Dr Mirjam Roeder was awarded HEIF funding to carry out some field work with the South African sugar company TSB. As global sugar demand is expected to fall there is keen interest in looking at alternative income streams for farmers, including using fractions of the crop for energy in the form of heat, power or electricity for the sugar mill or local communities.

The UK's Department for International Development is also keen to develop bioenergy in sub Saharan Africa and so the Tyndall Centre researchers would be particularly keen to hear from any alumni or other stakeholders with possible interests in bioenergy in the region.



## Living With Environmental Change

Researchers from Tyndall Manchester, led by lecturer Dr Ruth Wood, contributed to the production of the Research Council's Living With Environmental Change Infrastructure Report Card.

Their technical report, written to support the Report Card identifies the impacts of climate change on future energy demand and is now available on LWEC's website.

The Infrastructure Report Card and the accompanying journal article can be read in the ICE's journal Infrastructure and Asset Management:

<http://www.icevirtuallibrary.com/content/serial/iasma>



## Government policy is 'short sighted' on climate

Responding to a speech by new energy Minister Amber Rudd on Government plans to tackle climate change, Professor Kevin Anderson said: "The Secretary of State's eloquent speech is long on rhetoric but short on coherence. Let's be blunt, whilst the Minister has chosen to view her Department's responsibilities solely through a parochial financial lens – many poor people living in climatically more vulnerable parts of the globe will face the life and death repercussions of her Government's increasingly weak stance on climate change". You can also read Kevin's latest papers in **Nature**: <http://www.nature.com/nclimate/journal/v5/n4/full/nclimate2532.html> and **Nature Geoscience**: <http://www.nature.com/ngeo/journal/vaop/ncurrent/full/ngeo2559.html>



## Navigating the climate change challenge for shipping

Cutting the shipping sector's CO<sub>2</sub> emissions in line with global climate change targets will need an approach that goes beyond current regulations. This is according to a new report by researchers from the Shipping in Changing Climates Consortium at UCL and the Tyndall Centre. The new research recently presented at the Marine Environment Protection Committee (MEPC) of the International Maritime Organization (IMO) will illustrate the wide gap between what is needed to avoid 1.5/2°C of warming, compared with the current direction of travel of shipping CO<sub>2</sub>. The analysis shows how avoiding 1.5/2°C, whilst maintaining shipping's present 2-3% share of total anthropogenic CO<sub>2</sub>, requires at least a halving of its CO<sub>2</sub> emissions by 2050.

"Avoiding 1.5/2°C of warming with any reasonable degree of probability is a huge challenge for all fossil-fuel consuming sectors, and shipping is no exception. This new research illustrates the scale of challenge ahead and draws attention to a conflict between global climate change targets and the current expectations of rising CO<sub>2</sub> to meet the rising demand for international shipping", said Prof Alice Bows-Larkin.

"As we analyse the shipping sector and the results from climate science, we deal with many uncertainties. But one thing is certain: a transition away from fossil fuels is important, and urgent" said Dr Michael Traut, Research Associate at the Tyndall Manchester.

To download the full report, please click here:

[CO<sub>2</sub> Targets, Trajectories and Trends for International Shipping](#)

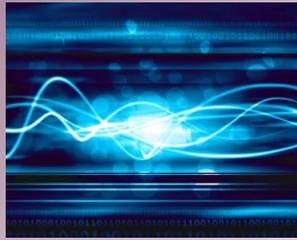
## Tyndall Manchester runs *amok* with a mock UN Climate Change Summit

In preparation for the UN climate change summit, which will be held in Paris in November, Tyndall Manchester recently ran a mock UN climate summit. University of Manchester staff took on the roles of member-states involved in these crucial talks. The debate surrounded both the timing of commitments to curtail each nation's carbon emissions and the shared investment of \$100bn to provide support for poorer nations. Once the nations had presented their initial ideas, the event organizers showed the likely results they would have in affecting climate change worldwide. The climate change picture was grim, with intolerable temperature increases seemingly unavoidable. As in the real negotiations, the group talked well past its deadline and asked numerous questions. When the question was asked what the key thing is that nations need to do to counteract climate change, Prof Bows-Larkin's answer was telling of the scale of the challenge facing us all: "There is not one strategy that will overcome these challenges". It will take significant work across a wide range of areas, along with agreement to change our behaviour across all countries, to really effect change.



## MY-STORE

Dr Ruth Wood, Dana Abi-Ghanem, Paul Gilbert, Sarah Mander, Chris Jones (all Tyndall Manchester) and Clair Gough (Alliance Manchester Business School) are collaborating on a EPSRC grant awarded to Dr Pierluigi Mancarella of the School of Electrical and Electronic Engineering.



The MY-STORE project (Multi-energy storage-Social, TechnO-economic, Regulatory and Environmental assessment under uncertainty) will strategically supplement the current research into energy storage and bring a new perspective by offering an understanding of the wide-scale deployment of energy storage in a broader context.

© 2010 VECARIUS, Inc.

The aim is to be the first in the world to provide such a comprehensive framework that can inform policy debates and the business community on the value and role of any storage technology in the transition towards more sustainable energy networks. The studies will focus on the UK situation, with time horizons from short to medium term (around 2035) and then opening up to 2050 and beyond.

Further information can be found on the EPSRC website: <http://gow.epsrc.ac.uk/NGBOViewGrant.aspx?GrantRef=EP/N001974/1>

## Power Station Water Intake Protection Against Clogging by Seaweed and Marine Species:

### A general modelling methodology for UK Power Stations

Dr Ben Rogers' and Professor Peter Stansby's latest EPSRC IAA Exploitation Secondment project, with sponsorship from EDF, addresses the emerging problem of seaweed ingress into cooling water intakes of nuclear power stations, which lead to expensive partial or complete shutdowns.



This project will use state-of-the-art computer simulations for combined tidal, wave and current flows in the TELEMAC computational suite of programs. This is coupled with a new downscaling methodology to take information from offshore weather systems to drive ocean wave models and ultimately the coastal wave and current climate in the vicinity of the power stations.

Appropriate transport algorithms in the code with a new seaweed backtracking algorithm, will enable seaweed ingress events to be predicted. The model will be demonstrated using case studies and will then be generalised for other power stations across the EDF Fleet.

## Industry 4.0

Dr Richard Kirkham and Professor Nik Mehandjiev (Alliance Manchester Business School) have been awarded a grant of from the British Standards Institution to undertake a short 3-month study into 'Industry 4.0' and the implications for UK manufacturing. The aims of the project are to:

- Establish scope of Industry 4.0
- Explore different models of Industry 4.0, including where this is defined differently, such as 'smart manufacturing' or 'Internet of Industrial Things'
- Perform a literature review to establish a view of Industry 4.0 issues, and the manufacturing sectors in which it is being applied
- Establish the range of existing standards activities currently underway of relevance to Industry 4.0, and identify any standards gaps
- Undertake stakeholder mapping and identification of the leading players in Industry 4.0 innovation

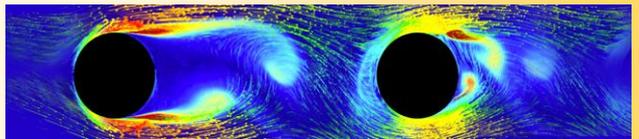
## £1m DECC award for Prof Tim Abram

Prof Tim Abram has recently been awarded a £1m grant from the Department of Energy and Climate Change to provide an Accident Tolerant Fuels capability within the Manchester's Nuclear Fuel Centre of Excellence (NFCE) laboratories. Accident Tolerant Fuels comprise fuel cladding and novel fissile materials that offer greater temperature capability than current fuels, and are therefore better able to withstand loss-of-coolant faults. There is considerable international interest in developing these fuels for both current and next-generation nuclear reactors.

This award will augment the already world-class facilities in the NFCE by providing a new laser joining lab for developing ceramic claddings; a Spark Plasma Sintering facility to allow the investigation of novel manufacturing of advanced fuel materials; and a Raman system for enhanced materials characterisation, as well as extending the capabilities of our existing equipment.



## EdF renews support for the Modelling and Simulation Centre (MaSC)



There is a longstanding and successful collaboration between the University of Manchester and EDF in Computational Fluid Dynamics. A Chair and Research Fellow funding agreement was signed between EDF SA and the University of Manchester in 2009. This agreement came up for renewal and we are delighted to announce that EdF have agreed to provide further financial support for several key appointments in the Centre.

The Modeling and Simulation Centre (MaSC) was founded in 2011 to bring together leading researchers from the University of Manchester, engineers from EDF Energy and industrial experts from EDF SA.

Four areas of interest have been defined:

- computational fluid dynamics
- solid mechanics (structural integrity)
- nuclear graphite and
- welding

Under the directorship of Prof Mike Smith, the Modelling and Simulation Centre aims to be a world-class interdisciplinary centre pioneering the development, validation and dissemination of modelling and simulation tools and techniques for complex engineering systems across a range of size and time scales.

# Grants & Awards

## Visualising trade-offs between high performing water supply investments



With financial support from Thames Water Utilities Ltd, [Prof Julien Harou](#) is embarking on a project to help water companies who must defend a 5-year water supply and demand management plan to regulators and public stakeholders.

The plan will be developed using a least cost approach, meet many societal and environmental constraints and objectives, and be acceptable to a wide range of stakeholders.

A new suite of visualisation tools are necessary to help visually display, interrogate and negotiate the composition, benefits, and scheduling of proposed plans.

This project proposes to summarise and demonstrate with examples the state-of-the-art in visualisation of infrastructure investment plots and diagrams. It will also build proof-of-concept browser-based software that hosts basic interactive water plans plots on a server and allow custom control of some of their characteristics (e.g. colour, orientation, etc.).

## Real time control of gasifiers to increase tolerance to biomass variety and reduce emissions

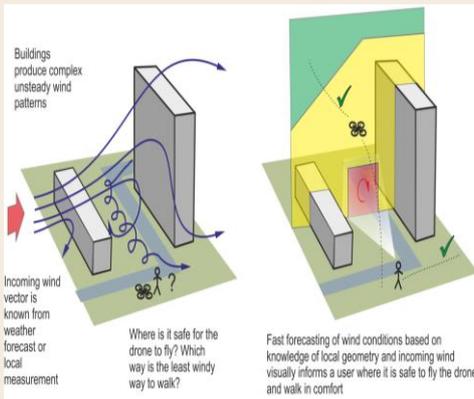
[Dr Paul Gilbert](#) is a co-Investigator on an EPSRC project that looks at utilising biomass resources. It is estimated that the UK has got 10-14 million tons of sustainable biomass which could be used to generate electricity and heat pa. Biomass can provide nearly 50% of the UK's energy needs by 2050.

Problems of utilising this is the accessibility of the biomass, the biomass variety and current processing options. Gasification is a process where biomass can be turned into its constituent components and produce hydrogen, carbon monoxide and methane, which can be used to drive a combustion engine or turbine to produce electricity, with heat being produced as part of the gasification process.

This multidisciplinary project will focus on the issues impacting poor gasification performance and will provide greater understanding of the role that biomass and its pre-treatment has on gasification efficiency and emissions. Solutions will provide benefit to users around the world, allowing reduced tar formation, less downtime, and increased feedstock opportunities. This has significant socio-economic potential to impact sustainable energy and power production in the UK and around the world, with global population benefits of reduced greenhouse gas emissions from using sustainable biomass resources.



## AirVision: Augmenting reality with fast forecasting of wind effects



[Drs Alistair Revell](#), [Bill Crowther](#), [Peter Hollingsworth](#) and [Ben Parslew](#) have been awarded a grant by Samsung to develop a technology that significantly pushes the state-of-the-art by reconstructing the unsteady wind field in the vicinity of an autonomous system or a human being, and processes this data to identify significant risks. The technology developed in this project will use real-time Computational Fluid Dynamics (CFD) to improve response to, and resilience against, wind speed events via visual information processing and augmented reality. People use various cues from their environment to actively predict the behaviour of wind and its effects, such that they can adapt their behaviour accordingly. Cues come from prior knowledge of the local weather forecast, local wind noise, motion of fixed and free objects moved by the wind, and wind forces reacted on the body. There are two main challenges with integrating wind cues into an augmented reality layer. Firstly, wind effects must be computed based on physics models, the local geometry and knowledge of the prevailing weather conditions.

Secondly, the output of wind calculations is a 3D unsteady vector field, which, if unfiltered, provides an overwhelming quantity of data for a user to interpret.

This project progresses the state-of-the-art by exploiting recent developments in real time CFD developments on novel many core platforms such as Graphical Processing Units (GPUs), which are highly energy efficient and often also used in mobile devices.

## Newton Fund Research Links Travel Grant

*Continued from page 2*

The research involved developing educational tools to introduce young learners to “drone” technology. Thailand has massive potential for using Unmanned Vehicles in sectors such as agriculture and the emergency services. The project included working with primary- and secondary-level learners in rural areas of Thailand.

This research continues an ongoing relationship between MACE and Thai universities. Last year Dr Ben Parslew, Dr Bill Crowther and Khris Kabbabe organized the [Newton Fund Workshop, “RoboShop”](#).

Ben also had an FCO-funded research placement in Thailand, and was later invited by the British Council to attend the [Thai National Science and Robotics Exhibition](#).



## Osborne Reynolds Day 2015

On July 7<sup>th</sup> MACE hosted the 13<sup>th</sup> [ERCOFTAC Osborne Reynolds Day](#). This annual competition, hosted each year by a different university, highlights the UK's doctoral research in Fluid Mechanics. The principal contributors to these Days are soon-to-be or newly graduated PhDs. In past years the event has included just oral presentations but MACE invited contributions to poster presentations too with attendees voting for the best ones during the buffet-lunch period. The day also included keynote lectures, one by Professor Peter Stansby and the other by Dr Simon Gallimore, worldwide head of Thermo-Fluids R&D at Rolls Royce.

Two of the three prizes for best posters were won by Manchester PhD candidates, Philip Pearce from Mathematics and Dean Wilson from MACE, with the third being won by Alessandro Orchini from Cambridge. The winner of the oral prize was Jacob Page from Mech Eng, Imperial College with John Craske, Civil Eng, Imperial College and Ton van der Bremer, Oxford University, runners up.

The day was judged to be so successful that the head of ERCOFTAC-UK has invited MACE to host the event next year as a preliminary step to it possibly being held here permanently. Of course, with Osborne Reynolds being the first professor of engineering in England and Professor Stansby being the inaugural Osborne Reynolds Professor of Fluid Mechanics, Manchester is clearly the natural home for the event!

The local MACE organization team consisted of Imran Afgan, Naheed Ahktar, Nick Bojdo, Andrea Bottacin-busolin, Hector Iacovides, Brian Launder, Michelle Mallon, Mike Smith and Peter Stansby with support from Olivia Al Noah from the Faculty Office. Appreciated sponsorship was received from Alstom and EDF Energy.



Dean Wilson, MACE Research Student, receiving his prize from David Standingford (Head of ERCOFTAC-UK) with Professor Michael Leschziner, Imperial College, Aeronautics (chairman of team of judges) in background.

## An academic writing retreat



A three-day pilot academic writing retreat took place with twelve PhD students from 29 June to 1 July. This was facilitated by Dr Paul W Chan and visiting [Professor Christine Räisänen](#). The retreat was designed to get students to work intensely on a focussed piece of writing intended for journal submission. The format comprised a mixture of short talks by the facilitators, small group discussions and lots of time and space for individual reflection and revision. The retreat

received positive feedback from the student participants. Heng Gu, a second year PhD student, remarked, "I used to get confused between the results and discussion sections of the paper. The retreat provided me with clarity on this." Participants also benefitted from a journal editor's insight into the editorial and review process. We hope to run similar retreats more regularly in future. For more information, please contact Dr Paul Chan (email [paul.chan@manchester.ac.uk](mailto:paul.chan@manchester.ac.uk)).

## AM Strickland Prize

The 2014 A M Strickland Prize has been jointly awarded to [Prof Paul Mativenga](#), Mrs Anis Fatima and [Dr David Whitehead](#) for their paper, 'Femtosecond laser surface structuring of carbide tooling for modifying contact phenomena'.

The prize was presented on 28<sup>th</sup> September 2015 at the Institution of Mechanical Engineers, London in attendance of the Manufacturing Industries Division Board.

Read the full text of the paper here: <http://pib.sagepub.com/content/early/2014/01/23/0954405413518516>



On September 2, a delegation from [National Formosa University](#) (Taiwan) led by its President, Prof Wen-Yuh Jywe, visited the School and discussed research and training collaborations with Prof Paulo Bartolo and colleagues from the Manufacturing Group. An MOU was signed on September 24<sup>th</sup>.

[Professor Yong Wang](#) and his former PhD student Dr Ashkan Shahbazian were awarded the 2015 Institution of Structural Engineers' Henry Adams Award for the best research paper published in *The Structural Engineer* in 2014.

The title of the paper is "performance based fire resistance design method for wall panel assemblies using thin-walled steel sections". This is the second time in four years that Professor Wang won this award.



## EASN's 5<sup>th</sup> International Workshop

On 2<sup>nd</sup> – 4<sup>th</sup> September 2015, the School hosted the [EASN's 5<sup>th</sup> International Workshop on Aerostructures](#). This event was co-organised by the University of Manchester Aerospace Research Institute and the European Aeronautics Science Network (EASN).

The workshop aimed to offer a forum for discussion and exchange of information about state-of-the-art research and development activities, to a pan-European audience.



## PM&S Resource Group support the 1st BUiD Doctoral Research Conference

As part of the collaboration between the British University in Dubai (BUiD) and the School of MACE, staff from the Project Management & Sustainability Resource Group attended the 1st BUiD Annual Doctoral Research Conference 2015 in Dubai on Saturday 16<sup>th</sup> May 2015. The conference was hosted by BUiD Vice Chancellor Prof Abdullah M Alshamsi. The keynote speaker was Professor Ghassan Aouad, president of CIOB who gave an inspirational presentation on "The Art and Science of Doing a PhD". Followed by the themes of: Innovation, Organising Complex Projects, Knowledge Management / Healthcare, Sustainability and Education. The sessions were presented by BUiD doctoral researchers and chaired by MACE academics.

The presentations were of high quality and 'best paper' awards were presented. Most of the researchers are professionals sponsored by their organisations to carry out high quality research with close industrial collaborations and application in the United Arab Emirates and the Middle East. PM&S's Anas Bataw and Maria Papadaki were instrumental in the organisation of the event. This conference gained regional attention and the next Conference will be held in 2016.



Dr Eric Lou, Dr Maria Papadaki, Anas Bataw, Dr Paul Blackwell and Dr Cassandra Papadopoulou

# Impact & Outputs

## UAE Khalifa University and AMEC Foster Wheeler visit MACE

On 8<sup>th</sup> June, the Project Management and Sustainability Resource Group ran a workshop for collaborators [AMEC Foster Wheeler](#) and the [UAE Khalifa University](#).

Five 4<sup>th</sup> year internship students and the BD Project Manager AMEC visited the University, which included a visit to the Laser Laboratory in the Manufacturing Technology Research Laboratory.

This workshop and networking event, hosted by Prof Andy Gale, was organized as part of an ongoing collaboration between the University and the Khalifa University's Nuclear group in Abu Dhabi which is supported by AMEC.



## REF Impact Case

Click here to download one of the School's highly rated REF Impact cases:

[Performance based structural fire engineering](#)



## Micro-fluidics lectures

Our thanks go to [Professor Nicole Pamme](#) from the University of Hull who gave a series of lectures on micro-fluidics for lab-on-a-chip devices in May. Open to all and free for MACE researchers to attend, the objective was to help us understand key concepts in a new field and to identify areas for possible future research collaborations. The 2-day programme was highly informative and successful, equally so in demonstrating an innovative means of initiating cross-disciplinary collaborations in academia.

## 2<sup>nd</sup> CIRP Biomanufacturing Conference

On July 29-31, the School hosted the 2<sup>nd</sup> CIRP Biomanufacturing Conference. This conference was designed to be an international forum to facilitate an exchange of information on biodesign, biofabrication and biomechanics, to discuss progress and future directions, and revise milestones if necessary. Around 60 presentations were made by researchers from 14 different countries. Accepted papers will be published in a special issue of CIRP Procedia (Elsevier Publication). During the conference several delegates paid a visit to the Manchester Biomanufacturing Centre, hosted by Prof Paulo Bartolo (see photo).



## Elsevier Atlas award

Each month a single Atlas article is selected from published research from across Elsevier's 1,800 journals by an external advisory board made up of individuals from NGOs.

The journal article "[Maximizing the greenhouse gas reductions from biomass: The role of life cycle assessment](#)" by Prof Patricia Thornley, Dr Paul Gilbert, Dr Simon Shackley and Dr Jim Hammond has been selected from thousands of recently published articles to be awarded the [Elsevier Atlas](#).

The award will be presented on 5 November. We will report further on this in the next issue of the Research Newsletter.

## Drs Revell and Harwood visit XJTU



Where's Ali ?

The aim of the project is to build strong collaboration in the area of Fluid-Structure Interaction and Computational Fluid Dynamics. XJTU is also home to one of the largest acoustic wind tunnels in Asia, with several MACE PhD students aiming to make use of this facility to obtain data for validation of their numerical studies.

In September [Drs Alistair Revell](#) and [Adrian Harwood](#) undertook a two-week research visit at Xi'an JiaoTong University (XJTU) in Shaanxi Province. Xi'an is one of the oldest cities in China and is also home to the Terracotta Army. During their visit they took part in a varied schedule of research seminars and workshops and also delivered a series of undergraduate lectures. This was the first in a series of staff and student exchanges planned over the next two years, funded via The Royal Society International Travel Grant. XJTU is ranked amongst the top twenty BRIC Universities and has a particularly strong reputation in structural mechanics related to aerospace engineering.

The **12th Engineering Project Organization Conference** took place from 24-26 June 2015 and brought together nearly 80 researchers to exchange ideas and research results on engineering projects.

The conference was preceded by a two-day PhD symposium, involving students from Stanford to Tongji in Shanghai, to discuss 'Novel Methods'. Papers for the conference can be accessed through: [www.tinyurl.com/EPOC2015-Programme](http://www.tinyurl.com/EPOC2015-Programme).

For more information, please contact the Conference Chair, [Dr Paul W Chan](#).



## All-electric Solar Impulse Aircraft



[Dr Neil Ashton's](#) article "Flying Solar" about the Solar Impulse Electric plane featured in the Summer Edition of [BBC Focus Magazine](#). Neil is a high flyer indeed - he has been invited to be a key speaker at the 3<sup>rd</sup> High Performance Computing and Big Data conference. It will be attended by Government ministers, industry and academia.

Read more about the conference on: <http://www.ukhpc.co.uk>

## Dr Lee Margetts wins



After 2 weeks of fast-paced online live chats, Dr Lee Margetts survived eviction to emerge as Energy Zone winner of "I'm an engineer, get me out of here!" and he has been awarded a prize of £500 to communicate his work with the public. This is a free online event where school students meet and interact with engineers. It's an X Factor-style competition between engineers, where the students are the judges.

The competition is sponsored by the Royal Academy of Engineering as a way of encouraging school students to consider engineering as a career. The competition involved 2474 students, 1378 questions and 1832 votes. Lee was one of 30 engineers selected by UK school students to take part in the finals. Visit [imanengineer.org.uk](http://imanengineer.org.uk) for more information.

# Recent Appointments

## Dr Glen Cooper

Lecturer in Solid Mechanics & Bioengineering



Dr Glen Cooper studied as a post graduate student in MACE on the Mechanical Engineering Design MSc and then stayed on to complete a PhD in the Design Reliable Systems funded jointly by EPSRC & Volvo Cars. He left MACE to join the University of Sheffield as a PDRA to test and make biomechanical performance improvements to ambulance stretchers.

This increased his interest in bioengineering and he moved to the University of Salford as Research Fellow in the School of Health. He worked on the development of rehabilitation aids for stroke patients involving whole body measurement, neuromuscular control and medical device development. He also investigated lower limb biomechanics linked to diabetes and knee-osteoarthritis.

Glen then became a Senior Lecturer in the School of Engineering at Manchester Metropolitan University where he taught in mathematics, structures, finite element analysis and he led the bioengineering research group. His research interests are in understanding medical problems through measurement and modelling, with a particular interest in diabetes, stroke, spinal and lower limb biomechanics.

## Dr Lee Margetts

Lecturer in Computational Mechanics



Dr Lee Margetts started his academic career with a BSc in Geology from the University of Durham and then worked for the Engineering Consultancy Division of Surrey County Council.

After a year out to study for an MSc in Geotechnical Engineering, he was seduced by the 4<sup>th</sup> largest supercomputer in the world (based in our own Kilburn building), he stayed at MACE to study for a PhD, developing parallel finite element software to simulate the Earth's geo dynamo.

Lee leads the open source [software project ParaFEM](#) and has used supercomputers to study dinosaurs, surgical procedures, biomechanics, nuclear reactors, aero-space composites and satellite antennae.

Lee also holds an MBA in International Engineering Business Management and is an elected member of the PRACE Industrial Advisory Board (Partnership for Advanced Computing in Europe).

## Dr Mark Quinn

Lecturer in Aerospace Engineering

Dr Mark Quinn graduated from the University of Manchester in 2009 with a MEng(Hons) in Aerospace Engineering. He then went on to complete a PhD in Experimental Aero-dynamics, particularly focused on unsteady compressible aerodynamics and flow diagnostics, also at the University of Manchester.



Upon completing his PhD in 2013, Mark began work at the Aircraft Research Association on optical flow diagnostics. In late 2014 Mark returned to the University of Manchester as a Knowledge Exchange Fellow and continued to work closely with the Aircraft Research Association and other industrial partners.

He started in his current role on September 1<sup>st</sup>. He is teaching on 'high-speed aerodynamics' undergraduate courses and he is writing a new module on experimental methods to begin in 2016.

In addition to teaching and research, Mark is involved in the School's Widening Participation activities in both a development and delivery sense.

## Dr Maria Sharmina

Lecturer in Energy and Project Management

Prior to completing her PhD at Tyndall Manchester, Dr Maria Sharmina completed a Master's programme in Economics at Central European University, combining it with research at the Center for Climate Change and Sustainable Energy Policy (Budapest, Hungary) and in the Institute of Energy Research at Joanneum Research (Graz, Austria). She obtained her first degree at the Far-Eastern National University (Vladivostok, Russia) specialising in Global Economy and International Management, graduating '*summa cum laude*'.



In 2014, Maria obtained an ESRC Nexus grant to investigate how energy, food and water are connected in the UK policy-development process. She has also worked on the EPSRC's Shipping in Changing Climates project; the 'Designing Sustainable Supply Chains' project sponsored by a major retailer; and, a project identifying research methods for modelling energy and water demand funded by University of Manchester Research Institute. Through the University's Researchers into Management programme, she has developed skills in research project management, team leadership and strategic planning.

## Dr Susie Riley

Lecturer in Aerospace Engineering



Dr Susie Riley graduated with a BEng (Hons) 1<sup>st</sup> Class in Aeronautical Engineering from Manchester University and began her career at British Aerospace Systems Commercial Aircraft Division.

During her time with BAe she completed an Engineering Doctorate at Manchester University, sponsored by BAe, researching Aircraft Design for Manufacture and Assembly. Susie spent 7 years at BAe with roles in design, production and sales before moving to Dyson Ltd where she was a senior project manager in the new product development organisation for 7 years.

After several years working as a management consultant on a variety of venture capital operations due diligence projects, Susie took time out of her career to be a full time mother. Three years ago she gained her PGCE teaching qualification, and alongside lecturing in aerospace engineering at the university, she also teaches physics at a school in Cheshire.

## Dr Mostafa Nabawy

Lecturer in Aerospace Engineering



Dr Mostafa Nabawy's research background lies within the fields of aerodynamics, aircraft design and modelling of engineering systems. In particular, he is interested in solving challenging multi-disciplinary engineering problems using analytical, computational and experimental tools.

He has made peer-reviewed contributions to outputs on subsonic wing aerodynamics, wing morphing, unmanned air vehicle (UAV) design, flight dynamics, piezoelectricity, and acoustics. Mostafa received his BSc degree in Aerospace Engineering (2007) and MSc degree in Aeronautical Engineering (2011) from Cairo University, Egypt. During his PhD research here in MACE, he developed theoretical models for flapping wing aerodynamics and piezoelectric actuator dynamics, and integrated these models to the design of insect-scale flapping wing vehicles. Following his PhD award, Mostafa took a postdoctoral research associate position at the School of MACE within the GAMMA Programme where he developed simulation toolset for the design of custom autopilot solutions.