

Newsletter

June 2022

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Welcome to the summer edition of the Hub Newsletter!

Our 2021 - 2022 Annual Report was published in May and we would like to thank everyone for their contributions.

A copy of the report can be viewed here:



[Annual Report](#)

Research

Synergy Promotion Call

In February, the Hub launched a call for Synergy promotion projects at TRLs 1 to 3, for novel research in composite manufacturing technologies pertinent to the priority areas identified by the Hub. The call was open to all UK academics eligible to receive EPSRC funding. 18 proposals were received from 22 UK academic institutions. It was good to see that nine of these institutions were new to the hub. A rigorous review process was conducted following EPSRC guidelines and the following proposals were ranked the highest and selected for funding:

1. Dr Edward McCarthy, University of Edinburgh - **Thermoplastic In Situ Polymerisation (TPIP) and Double Diaphragm Forming (DDF) for Moulding of Complex Parts at Scale**
2. Dr Han Zhang, Queen Mary University of London - **Energy Efficient Composite Tooling with Integrated Self-Regulating Heating and Curing Capabilities based on Recycled Composite Waste (ECOTOOL)**
3. Dr Jonathan Belnoue, University of Bristol - **A Numerical Tool to Aid Design-for-Manufacture of Injection Over-Moulded Composite Parts**

We look forward to working with new academic partner Queen Mary University of London, and hearing about the project results over the course of the year.

Hub Outreach Activities [1/2]

Advanced Engineering and Manufacturing Technologies Show (MACH 2022) – NEC Birmingham 4-8 April 2022

The Composites Hub joined the Future Metrology Hub and the Future Electrical Machines Manufacturing Hub on a Hub stand sponsored by the EPSRC. It was a great opportunity to engage with the other Hubs and the wider engineering community. Many thanks to Christian Young for organising the stand.

The Fifth International Symposium on Automated Composite Manufacturing (ACM5) - National Composites Centre, Bristol 14-15 April 2022

The Hub was a main sponsor of the event and over the course of the two days, a combination of presentations and posters were delivered by Hub members, as well as a keynote presentation delivered by the Hub Director, Professor Nick Warrior.

JEC World 2022 – Paris – 3 -5 May 2022



JEC is the leading international composites show and the Hub Business Development Managers, Simon Quinn and James Whyman attended the show.

This year's show had representation from more than one hundred countries and over a thousand exhibitors presented their ground-breaking innovations to 20,000 trade visitors. Key themes emanated from amongst the stands and speakers, notably sustainability, the circular economy and turning waste and recycling into opportunities.

Hub Outreach Activities [2/2]

Sessions led by new SMEs such as Bcomp, a Swiss company, are pioneering the use of natural fibres in multiple industries. Sustainable composite-based hydrogen storage solutions also featured heavily, with many countries representing their novel solutions.

One eye catching stand featured the partnership of Belgian's multinational chemical company Solvay with Vertical Aerospace Ltd. They showcased their exceptionally ambitious plan to create the world's first passenger air taxi, VX4. Solvay's expertise in composites and adhesives and technical know-how, combined with Vertical Aerospace's electric vertical take-off and landing (eVTOL) design and engineering, will bring the future of emissions-free, affordable flight to reality.

Attending JEC gave the Hub's new Business Development Managers exposure to the industrial international composites community, their most recent commercial offerings and an insight into their current challenges. Several contacts were made, for potential future collaboration and some early discussions and information sharing has already taken place.

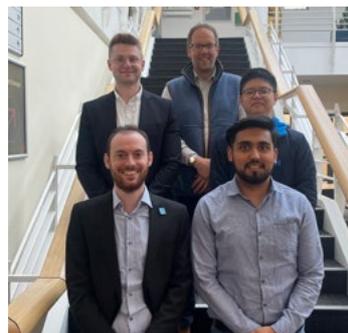
The Fifth International Symposium on SAMPE UK & Ireland Annual Seminar

At the recent SAMPE annual seminar held at Cranfield University, Hub students Guy Lawrence from the University of Nottingham and Phil Druiff from the University of Bristol were the winners of the student seminar competition. They will go forward to represent the UK in the next round of the competition which will take place in Hamburg, Germany on 15 – 17 November 2022.



[More Information](#)

The photo shows SAMPE attendees. Back row, left to right: Guy Lawrence, PhD student, University of Nottingham; Dr Lee Harper (SAMPE committee member); Zhuofan Qin, PhD Student, University of Northumbria. Front row, left to right: Phil Druiff, EngD student, University of Bristol; Usman Shafique, PhD student, University of Nottingham.



Upcoming Events

Hub Open Day – 13 September 2022 - AMRC

The Hub are pleased to announce this year's open day will take place at The Advanced Manufacturing Research Centre (AMRC), University of Sheffield on 13 September 2022.

Registration for the event is now open and the programme for the day will be released shortly along with information on the delegate dinner.



[More information and registration](#)

The International Conference on Manufacturing of Advanced Composites (ICMAC 2022) – 14 September 2022 - AMRC

Following the open day, the Hub will be supporting The International Conference on Manufacturing of Advanced Composites (ICMAC 2022) on 14 September 2022, which will also be held at the AMRC, University of Sheffield.



[More information and registration](#)

To keep up to date with our events visit:



<https://cimcomp.ac.uk/hub-news/>

Researcher Network

The Hub would like to congratulate **Dr Oriol Gavalda Diaz** from the University of Nottingham on his new role as Chair of the Researcher Network. Oriol takes over from Dr Mikhail Matveev, as Mikhail moves on to an academic position within the Faculty of Engineering at Nottingham.

The Hub would like to thank Mikhail for his hard work and support to the Researcher Network over the past few years.

Happy Retirement to Ivana Partridge

Ivana Partridge is a well-known figure in the composites community, having had a distinguished career spanning many years. After several years of working part-time at the University of Bristol, Ivana decided to retire at the end of May 2022. She leaves behind her the legacy of the Industrial Doctoral Centre (IDC) in Composites Manufacture, which will continue under the leadership of Professor Janice Barton.

The IDC is testament to Ivana's strong engagement and pastoral care with students, throughout her career she created a family of researchers, which she remains in contact with, many are connected to the Hub. Ivana's early ground breaking work on polymers and interleaving, now a main stay in most composites taught programmes, provided the scientific underpinning for interleaved toughened prepregs now widely used on A350, 787 etc. Other notable excellent research is Ivana's seminal contributions to through thickness reinforcement in the form of Z-pinning and tufting. In 2010 Ivana was a key member of the team forming CIMComp, leading Cranfield University's participation, working with Professor Andrew Long at Nottingham and Professor Kevin Potter at Bristol. In 2011, Ivana led the proposal to set up the EPSRC IDC in Composites Manufacture, which is a true collaborative project, led by Cranfield, forming part of CIMComp

led by Nottingham, and linked to Bristol via the National Composites Centre (NCC).



The photo was taken at Ivana's retirement networking event.

Staff News [2/2]

In 2012 after 33 years at Cranfield, Ivana moved to Bristol to be closer to the NCC. Ivana is an inspirational role model for female engineers, she is someone to admire and aspire to. It is notable that a large proportion of the IDC cohorts are female. We celebrated Ivana's achievements in a special networking event at Bristol at the end of May.

Congratulations to Ivana on her outstanding achievements. We thank her for all she has done for the Hub and wider composites community and wish her all the best for her retirement.



The current cohort of students with Ivana at her retirement celebration.

Hub Equality, Diversity & Inclusion (1/2)

The Hub has a commitment to ensure that equality, diversity and inclusion is embedded at all levels and in all aspects of Hub research practice and funding policy. Hub EDI champion, Dr Connie Qian from the University of Warwick, has recently formed an EDI committee. They will help deliver the Hub's strategic aim of creating a fully inclusive culture that is proactive in initiating change and driving forwards best practice in EDI matters.

The EDI committee:

Dr Adam Joesbury, University of Nottingham

Prof Alistair McIlhagger, Ulster University

Dr Alex Skordos, Cranfield University

Ángela Lendínez Torres, University of Nottingham

Dr Connie Qian, University of Warwick

Dr Carwyn Ward, University of Bristol

Joanne Eaves, University of Nottingham

Dr Michael Johnson, University of Nottingham

Dr Oriol Gavalda Diaz, University of Nottingham

Dr Iryna Tretiak, Research Associate, University of Bristol, (pictured on the next page) has kindly shared her EDI success story below:

"I was awarded a Hub Researchers Award with my colleague Dr Geir Olafsson. Our project was about in-process monitoring for AFP processes using Infra-red sensors, to facilitate the detection of variations in ply thickness, fibre content and formation of defects. I was attracted to this award because this was one of the very few grants where a postdoc was allowed to lead a project as the PI. This award enabled me to demonstrate my proposal writing skills and build my track record, and more importantly, it helped me to develop my leadership skills and provided me an invaluable opportunity to develop my own research ideas.

I come from Ukraine and have been living in the UK since I came to study my PhD a few years ago. I was brought-up in a family of medical doctors, so when I was little, I was expected to become another one. However, my dream was to become an engineer, as I was always interested in planes – how they work and how they are made, and I was very good at maths in school. I received great support from my grandad. He encouraged me to pursue my dream and helped me to prepare for the university entry exams, and I succeeded!"

Hub Equality, Diversity & Inclusion (2/2)

"There have been many challenges on my journey though. At university, people pointed their fingers at me, commenting on how inappropriate it is for a woman to study engineering. After graduation I've been making slow progress in my career because I take on more caring responsibilities for my family (than my husband) – I think this is common. I found it particularly hard when returning to work after my first maternity leave, and I'm expecting a second baby soon.



My advice for people experiencing the same challenges: It will be tough, but don't give up. You can be anything you want to be, and don't listen to other people telling you that you can't. I'm also keen to support other females in engineering. For example, I've recently helped a female engineer friend of mine from Ukraine to find a job opportunity here in the UK by identifying a research area in a large project where her skills could fit nicely."

Hub Training (1/2)

As 2022 has started to see travel restrictions ease, it was a good opportunity for the Hub to relaunch its **International Exchange Programme**. The first student to embrace the opportunity was EngD student **Lachlan Williams** from the University of Bristol. Lachlan is currently undertaking a three month exchange to Airbus based in Hamburg, Germany.



“Normally my efforts focus on researching Manufacturing Process Simulation (MPS) as an EngD in the Industrial Doctoral Centre in Composites Manufacture, with a specific focus on forming simulation. For over 2 months I have been overseas in Hamburg, Germany, learning about structural analysis, applied to the Airbus A350 Freighter programme. This opportunity, funded by the Future Composites Manufacturing Research Hub’s International Exchange Programme, has allowed me to reach outside of my normal research area and learn about the larger structural simulation ecosystem. My work is a part of observing and implementing structural analysis on a live programme which informs my understanding of where forming simulation can provide enriching value, where it is required, and finally how a practical forming simulation tool must function to be useful when deployed. It is an interesting time to be here. Digitalization is slowly but surely transforming the ways of working in aerospace. Standing here now, during the transition, you can see both the legacy ways of working and the possibilities which can be enabled by digitalization, just over the horizon. Perhaps the insight gained from this placement will help my research contribute to bringing that new future to the present.”

Hub Training [2/2]

For more information on the International Exchange Programme please go to: <https://cimcomp.ac.uk/hub-training/> or for informal queries contact Dr Michael Johnson (Chair of the Post Graduate Committee).

michael.johnson@nottingham.ac.uk.

The Hub has worked closely with its Industrial partner Pentaxia <https://pentaxia.com/> to create a bespoke course which will be delivered at their company premises in Derby on 8th – 12th August. The training programme will be an intensive five day 'hands on' course available for six attendees, covering the following aspects: Mould Design, CNC Programming, WI creation / Kit templating & nesting, Laminating and Inspection. If the course proves a success the Hub will look at scheduling training sessions each quarter going forward.

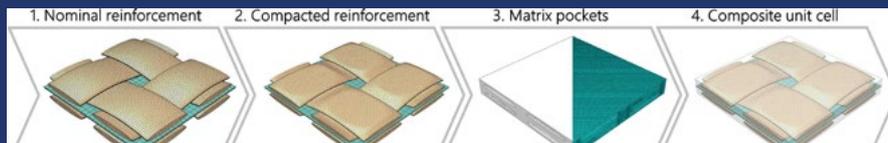
If students and researchers have suggestions for specific training opportunities which the Hub can support please get in touch:

EN-INFO-CIMCOMP@exmail.nottingham.ac.uk.

Publications

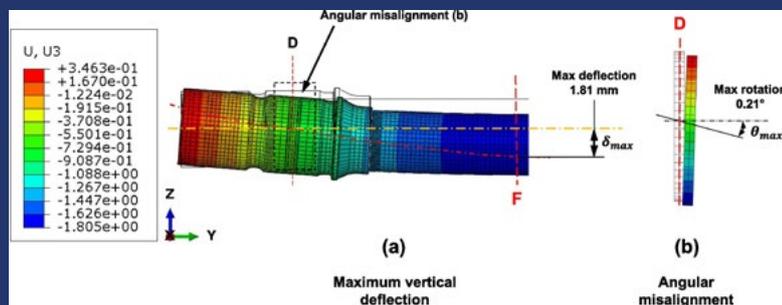
2022 Q2 Publications

Valkova, M., Anthony, D.D., Kucernak, A.R.J., Shaffer, M.S.P., Greenhalgh, E.S. (2022). **Predicting the mechanical behaviour of structural supercapacitor composites** Composites Part A: Applied Science and Manufacturing, vol 156, 106860. <https://doi.org/10.1016/j.compositesa.2022.106860>



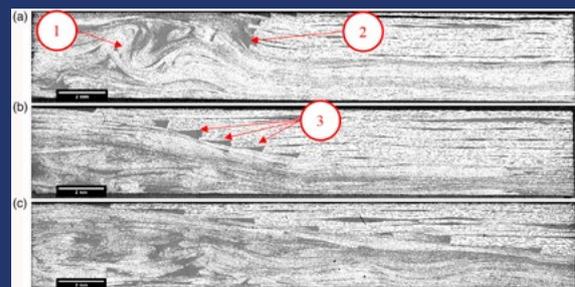
SSC modelling workflow. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article).

Johnson, M.S., Evans, R., Mistry, P.J., Li, S., Bruni, S., Bernasconi, A., Cervello, S. (2022). **Structural analysis for the design of a lightweight composite railway axle** Composites Structures, vol 290, 115544. <https://doi.org/10.1016/j.compstruct.2022.115544>



HMC axle under the combined moments. (a) Vertical displacement field plot (half model) compared against the undeformed state, with a scale factor of 20 applied showing maximum deflection, δ_{max} , at Position F. (b) Angular misalignment angle, θ , at Position D caused by the axle vertical deflection at the journal seat, with a scale factor 10 applied.

Evans, A.D., Turner, T., Harper, L.T., Warrior, N.A. (2022). **Design guidelines for hybrid continuous/discontinuous carbon fibre laminates** Journal of Composite Materials, Vol. 56(10) 1513–1527. <https://doi.org/10.1177/00219983221078786>



Micrographs (5x magnification) of stepped unidirectional/discontinuous carbon fibre joints produced by co-compression moulding. Step sizes (a) 0 h, (b) 5 h and (c) 10 h. Point 1 indicates fibre swirling and Points 2 and 3 indicate some locations of resin richness at the end of each ply drop.

Research Associate/Fellow in Composites Manufacturing

The Faculty of Engineering at the University of Nottingham is inviting applications for a position of Research Associate/Fellow in Composites Manufacturing. The successful candidate will join the established interdisciplinary team working on the Core project "Resin injection into reinforcement with uncertain heterogeneous properties: NDE and control" funded by the Hub.



[Click here for more information](#)

Research Fellow in Advanced Automated Composite Preforming Technologies

The Faculty of Engineering at the University of Nottingham is looking to appoint a Research Fellow to develop advanced automated composite preforming technologies.



[Click here for more information](#)

Product Development Scientist Hexcel Early Career Program

The Early Career Program will help participants gain the necessary skills and knowledge through comprehensive and holistic learning experiences, projects, training, networking, interaction with corporate executives, and ongoing exposure with customers. Program graduates have the technical, business, and leadership foundation to proactively and continuously make innovative contributions to the future of Hexcel in positions best suited to match their individual career goals.



[Click here for more information](#)

PhD Positions in Next Generation Fibre-Reinforced Composites

PhD positions are available in Next Generation Fibre-Reinforced Composites. The NextCOMP programme is a £6M EPSRC funded programme grant, a collaboration between Imperial College London and the University of Bristol which is fundamentally redesigning high performance composite materials. [There are currently four PhD Studentship positions which are detailed on the project website which are available now.](#)

Three positions are open to students, including funding for international candidates, as well as Home (UK), EU citizens who have confirmation of UK settlement or pre-settlement status;

- [Arrest of Compression Crack Growth and Failure Investigation of Fibre-reinforced Composites \(AE0001\) @ Imperial College London](#)
- [Compression Failure in Fibre-reinforced Composites: Identifying Mechanisms and the Effect of Architectural Modifications \(Ref: AE0008\) @ Imperial College London](#)
- [Compression Failure in Fibre Reinforced Composites \(Self-Funded Only\) @ University of Bristol](#)

One position is open to only Home (UK) and EU citizens who have confirmation of UK settlement or pre-settlement status;

- [Novel Hierarchical Composites for Improved Compressive Performance @ University of Bristol](#)

Why apply for this PhD?

- You will be working on an exciting area of study developing a new kind of composite which could revolutionise the composites industry.
- You will have access to excellent facilities including those at the National Composites Centre, who are a NextCOMP partner.
- You will be funded subject to meeting the funding eligibility requirements (unless indicated otherwise).
- You will be part of a large team including renowned academics, Post-Doctoral Researchers and other PhD students from across both Imperial College London and University of Bristol, offering significant opportunities for professional development.
- You will be working as part of a large programme grant which has links to numerous industrial partners, and we will actively encourage you to disseminate your research at conferences, through publications, and public engagement activities.

To see some of the recent activities check the [latest news](#) and follow us on twitter [@NextCOMP_ac_uk](#).

To view current PhD students talking about their work please see the youtube video:



[NextCOMP: A full-scale redesign for fibre-reinforced composites](#)



CIMComp
EPSRC

Future Composites
Manufacturing Research Hub

If you would like to contribute to our quarterly newsletters,
please contact Joanne Eaves:



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2022