

Newsletter

December 2021

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Engineering and
Physical Sciences
Research Council

Welcome to our winter edition of the Hub Newsletter!

Feasibility Study Call

The latest call for Feasibility Studies focused on Sustainability in Composites Manufacturing. 27 proposals were received, which underwent a robust review process following EPSRC guidelines. The process resulted in five grants being awarded, each receiving £50K to fund a six month study. The following proposals were successful:

- Dmitry Ivanov, University of Bristol, “**Advanced Dynamic REpair Solutions for Sustainable Composites (ADDRESS)**”
- Tom Turner, University of Nottingham, “**Furthering the Uptake of Carbon Fibre Recyclates by Converting into Robust Intermediary Materials Suitable for Automated Manufacturing**”
- James Kratz, University of Bristol, “**Additively Manufactured Cure Tooling (ADDCUR)**”
- Dipa Roy, University of Edinburgh, “**Manufacturing Value-Added Composites for the Construction Sector Using Mixed Waste Plastics and Waste Glass Fibres**”
- Davide de Focatiis, University of Nottingham, “**Rewinding Tape Laying: Can Direct End-of-Life Recovery of Continuous Tapes be a Step-Change in the Sustainability of Thermoplastic Composites**”

Hub Training and Networking Opportunities [1/2]

Vitae Training Workshop

The Hub offers students and researchers complimentary membership to Vitae, which provides analysis tools and training to enhance professional development. Vitae provided Hub students and researchers a half-day workshop in Nottingham as an introduction to the framework. It was an interactive, face to face session that looked at individual development needs and setting personal objectives. The session concluded with a reflection on individual progress, providing evidence and communicating effectively about professional competencies to a variety of audiences. For more information on the programme offered go to:



cimcomp.ac.uk/hub-training/



Hub Training and Networking Opportunities [2/2]

Researcher Network Awards

In early December, the Researchers Network held the first in-person networking event since February 2020. The Hub researchers visited Warwick Manufacturing Group. A lively social gathering and an exciting lab tour were organised by Dr Connie Qian, the Hub's Innovation Fellow at WMG. The event was attended by almost 30 researchers from 7 universities across the UK (Bristol, Cambridge, Edinburgh, Manchester, Nottingham, Sheffield, and, of course, Warwick).

A large part of the event was the Hub Researchers Award competition. The competition featured pitch-style presentations from several researchers in a bid for small-scale funding to support their research ideas. All researchers were participating in the peer-review of the presentations with help from the panel chair, Dr Ian Gent from GKN Aerospace (Hub Alumnus). While all presentations were of very high quality, two were awarded the Hub Researchers Award:

George Street, University of Nottingham:

"The Effect of Non-isothermal Conditions on the Shear Behaviour of Fibre Reinforced Thermoplastic Composites"

Dr Geir Olafsson and Dr Iryna Tretiak, University of Bristol:

"Inspection and In-process Evaluation of Prepreg Fibre Volume Fraction for Improved Part Quality"

Events and Outreach [1/3]

Hub Open Day

The Hub Open day was a huge success in October 2021, with a virtual attendance of over 95 delegates from a range of international academic and industrial groups. It was hosted by the University of Edinburgh, a Hub Spoke, who made the day very engaging and enjoyable.

The Hub programme welcomed keynote speakers Dr Adrian Gill, from Vestas Wind Systems, who gave an informative presentation on “**Composites Manufacturing in the Wind Industry**”, and Dr Isabelle Paris from Bombardier Aviation, who gave an interesting presentation on “**Industry Perspectives on Composite Airframe Structures Development and Certification**”.

The day was split into parallel sessions, each comprising a selection of presentations by Core Project leads and Innovation Fellows. This structure provided delegates with the opportunity to transition between sessions to listen to their preferred talks.

The quick fire student session consisted of 18 PhD Student and Researcher presentations, which was a great opportunity for them to showcase highlights of their current research. The best presentation was judged online by delegates and the winning prize was awarded to George Street. His presentation can be viewed here:



[Hub Open Day Presentation](#)

The Hub held its second annual Composite Design and Make competition at the Open Day, in conjunction with the Society for the Advancement of Material and Process Engineering (SAMPE) UK and Ireland Chapter.

Participants applied their engineering knowledge to build a composite bridge with allocated materials, to support a 1kg load at the mid-span, but with an overall structural mass of less than 250g. The challenge was well received with three teams from the University of Bristol and the National Composites Centre, the University of Edinburgh and the University of Nottingham competing for the cash prize.

Events and Outreach [2/3]

The winning team was 'Uni Edi' with a bridge span of 4.57m and a mass of 249g.



The annual Hub Open Day was aligned with the IOM3 International Conference on Manufacturing of Advanced Composites (ICMAC). This three-day event was organised on behalf of the British Composites Society (a division of the Institute of Materials, Minerals and Mining) and was held virtually due to the COVID pandemic. ICMAC21 brought together composite manufacturing scientists, engineers and end users from academia and industry to hear about the latest developments from pioneers and emerging leaders in the composites field.

Events and Outreach [3/3]

The extensive programme was attended by over 120 delegates and featured over 60 oral presentations across two parallel sessions each day. There was a truly international feel to the conference, with delegates online in New Zealand, Japan and USA to present papers. Stimulating keynote presentations were delivered at the beginning of each day, inspiring and captivating attendees.

Prof Steven Eichhorn gave the Swinburne Medal Lecture, after being awarded the accolade by the IOM3 for his outstanding contribution to the advancement and knowledge of cellulosic materials. His presentation was titled “Nanocellulose: Top Down and Bottom Up Production and Properties”.

Advanced Engineering Show

The Hub were pleased to return to face to face events this year and attended the Advanced Engineering Show on 3 – 4 November at the NEC, Birmingham, UK. It is the UK's largest annual engineering and manufacturing event that connects OEMs, Tier 1 manufacturers and supply chain partners.

The Hub's newly designed stand attracted a lot of interest from delegates and provided an opportunity for Hub members to network and engage with the industrial community.



Upcoming Hub Events/ Save the Date

International Mission with UBC/Convergent 8 February 16:00 – 19:00 UK time (virtual)

The Hub have scheduled an International mission with UBC/Convergent and are very much looking forward to the event to investigate possible research links and collaborations for the future.

Synergy Event – 23 February 2022

The Hub are pleased to announce that a third Synergy Workshop will be taking place on 23rd February 2022 at The Hilton Hotel, East Midlands Airport. The event will explore and build on current project synergies, with plenty of time planned for networking to enable individuals to identify new opportunities.

Sustainability Workshop – The National Composites Centre – 30 March 2022

The Hub will be working in conjunction with the National Composites Centre to deliver a Sustainability Workshop to Hub members. The workshop will consist of a series of quick-fire presentations from the NCC encompassing Sustainability challenges, developments and project outputs relevant to Hub members.

More information on the above events will follow shortly.



Please keep up to date with our upcoming events at:

www.cimcomp.ac.uk

Research

2021 Q4 Publications

Chen, S., Joesbury, A., Yu, F., Harper, L.T., Warrior, N.A. 2021.

Optimisation of Intra-ply Stitch Removal for Improved Formability of Biaxial Non-crimp Fabrics.

Composites Part B: Engineering Volume 229.

<https://www.sciencedirect.com/science/article/pii/S1359836821008313?via%3Dihub>

Comparison of detailed defects between the preform using the optimum stitch removal pattern and the baseline (without stitch removal).



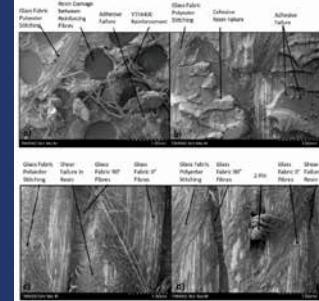
Noble, T., Davidson J.R., Floreani, C., Bajpai, A., Moses, W., Dooher, T., McIlhagger, A., Archer, E., Ó Brádaigh, C.M., Robert, C. 2021.

Powder Epoxy for One-Shot Cure, Out-of-Autoclave Applications: Lap Shear Strength and Z-Pinning Study.

Journal of Composites Science, Volume 5.

<https://doi.org/10.3390/jcs5090225>

SEM Pictures of Fracture Surfaces with $\times 80$ Zoom for (a) VTFA400 Specimens (b) Cured and Bonded with Powder Epoxy (c) Co-cured and (d) Co-cured and Z-pinned.



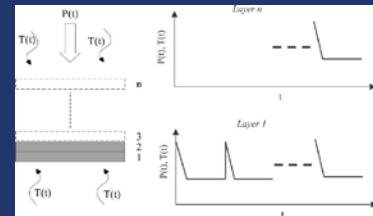
Struzziero, G., Barbezat, M., Skordos, A.A. 2021.

Consolidation of Continuous Fibre Reinforced Composites in Additive Processes: A Review.

Additive Manufacturing. 2021.

<https://doi.org/10.1016/j.addma.2021.102458>

Schematic representation of the LbL process and the evolution of pressure (P) and temperature (T).

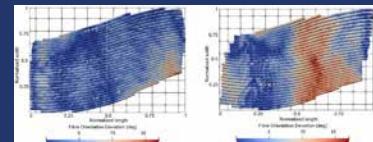


Sun, X., Belnoue, J.P.H., Wang, W., Kim, B.C., Hallett, S.R. 2021.

"Un-forming" Fibre-steered Preforms: Towards Fast and Reliable Production of Complex Composite Parts.

Composites Science and Technology

<https://www.sciencedirect.com/science/article/pii/S0266353821004164>



Deviation of the experimental projected fibre trajectories between (a) the formed steered preform and the preform with as-designed fibre trajectory derived in FEA; (b) the UD preform and preform with as-designed fibre trajectory derived in FEA.

Staff News [1/2]

The Hub would like to congratulate **Dr Mikhail Matveev** on his appointment to Assistant Professor in the Faculty of Engineering at the University of Nottingham. Mikhail has a background in Applied Mechanics with a BSc and MSc from St Petersburg Polytechnic University in Russia. Prior to his PhD, he worked as a stress analyst in the energy sector for two years. He obtained his PhD at the University of Nottingham with a thesis on 'Meso-scale modelling of textile composites with defects' and has since worked on the characterisation and modelling of manufacturing processes. Mikhail has been Chair of the Hub's Researchers Network and will continue to be involved in research activities within the Hub. We wish Mikhail the very best in his new role.



PhD student, **Michael Causon**, graduated from the University of Nottingham in 2021 with a degree in Mathematics and is now continuing at the university as a PhD student in the Applied Mathematics group. "My research is aligned with one of the Hub's Core Projects, "Resin injection into reinforcement with uncertain heterogeneous properties", and this work aims to build on the uncertainty quantification of preform permeability during the RTM process, using on the fly data assimilation techniques. Specifically,

I am working with my supervisors to improve the speed of such algorithms."



[Click here for project information](#)

Staff News [2/2]

Researcher, **Dr David Brigido**, has recently completed his PhD thesis and has been appointed as a Research Associate working on the Hub funded Core Project "Fibre-Steered Forming Technology". The project aims to combine highly aligned discontinuous fibre reinforced composites, produced with the High-Performance Discontinuous Fibre Composites, with the Tow Shearing Technology. "I am responsible for the production and characterisation of highly aligned discontinuous fibre reinforced composites tapes with the Third Generation HiPerDiF machine, located at the National Composite Centre."



Recruitment Opportunities

Research Associate or Senior Research Associate in Composites Manufacturing at the Bristol Composites Institute



[Click here to find out more](#)

Post Doctoral Associate in Structural Design of Composite Morphing Blades for Tidal Turbines (6 months)



[Click here to find out more](#)

EPSRC DTP Studentship - Modelling of Composite Fabric Processing



[Click here to find out more](#)

Research & Technology Engineer - Hexcel Early Career Program



[Click here to find out more](#)

Other News

IDC Showcase, Tuesday 26 October 2021

The Industrial Doctorate Centre in Composites Manufacture held its Showcase event on Tuesday 26th October at Engineers House in Bristol, which was followed by a celebratory dinner at the Hotel Du Vin, Avon Gorge. The IDC has been running since 2013 and recently recruited its final student, hence the Showcase and a new brochure to mark this milestone. The brochure highlights the taught units and IDC research projects, including articles on the journey of Research Engineers and their study tours. The Showcase was a special cohort building event for the IDC Research Engineers to celebrate their achievements, recognising the support from industrial collaborators, academic partners and project supervisors. The Showcase proved to be a wonderful opportunity for the cohort to come together in person and provide an insight into their diverse research activity in composites manufacture through a series of oral and poster presentations.

Prizes awarded for the best poster went to:

1st Prize: Claudia Jimenez Martin "Forming of Complex Aerostructures for Next Generation Aircraft Wings"

2nd Prize: Preetum Mistry "The Design of a Lightweight Composite Railway Axle"



FastBlade Tidal Blade Composites Fatigue Testing Facility

Hub Spoke, University of Edinburgh are pleased to share news that this testing facility is now in operation. More information on this can be viewed here:



fastblade.eng.ed.ac.uk

Composites for Future Resilience – Bristol Composites Institute Annual Conference

The 14th annual Bristol Composites Institute conference was held virtually on 9th November 2021. Sustainability was one of the key themes at this year's conference, which attracted over 250 attendees from six continents.



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

 joanne.eaves1@nottingham.ac.uk.

On behalf of the EPSRC Future Composites Manufacturing Research Hub we would like to thank you for your ongoing support and wish you all a very Merry Christmas and a Happy New Year.

