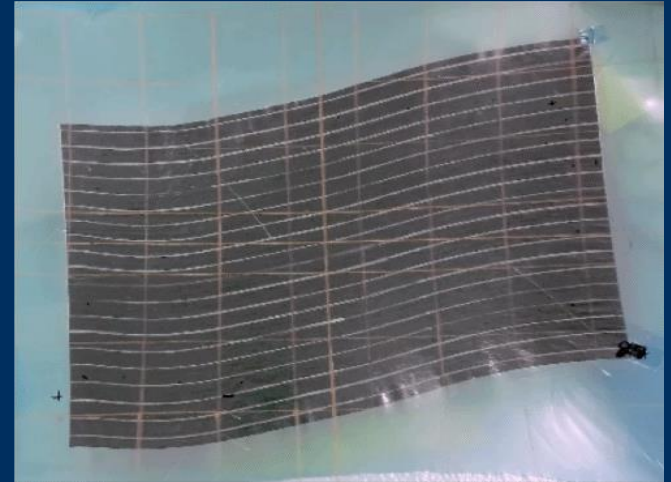


Manufacturing & Design

Ole Thomsen



Forming of fibre-steered preform

Manufacturing and Design Academic Team

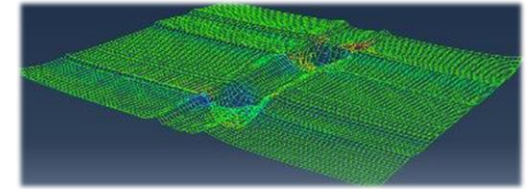


Core activity

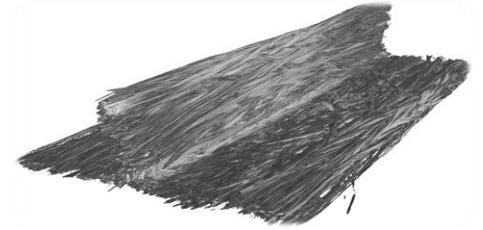
The Manufacturing and Design theme group focusses on developing the means to turn ideas into hardware through efficient design and manufacturing practices. We build an in-depth understanding of current processes and develop novel and innovative manufacturing approaches, to deliver improvements in cost cost, quality and functionality across a range of industries

Research focus areas:

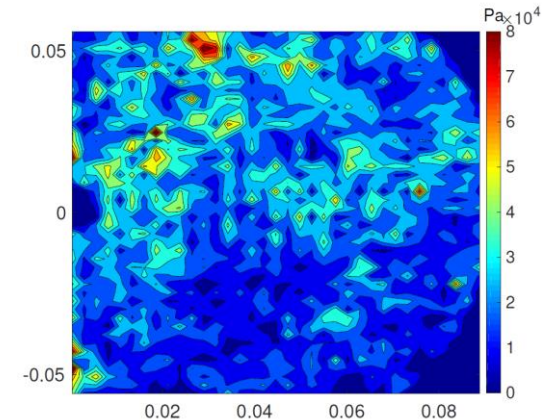
- Process automation – automated fibre placement
- Continuous tow shearing
- Defects and features in composites manufacturing
- Understanding lay-up processes
- Design for manufacture
- Composites recycling
- Manufacturing of functional composites
- Numerical modelling of manufacturing processes
- Robotics and cobotics
- ...



Forming simulation of a modified preform



Stabilisation of net-shaped preforms



Pressure map of composite preform showing low pressure area

Selected highlights

- James Kratz:
 - Started EPSRC New Investigator Award: Real Time-AFP
 - Appointed to EPSRC Early Career Forum in Manufacturing Research
- Eric Kim:
 - iCOMAT: Start-Up business of the year award from Composites UK
 - IAA with Owens Corning (Jan 2021~) - Delamination suppression technique for composite wind turbine blades
- Carwyn Ward:
 - Young Engineer and Student (YES) Sub-Committee of SAMPE UK + EIRE
- New EngD projects: AirborneUK (2), iCOMAT, NCC (2)

EPSRC Future Composites Manufacturing Hub

cimcomp.co.uk



Engineering and
Physical Sciences
Research Council

- Total EPSRC total investment of £10.4M led by the University of Nottingham
- Kick-off January 2017 – duration of 7 years
- Initially 5 partner universities – Nottingham, Bristol, Manchester, Imperial College with spokes Cranfield and Southampton
- Now 16 partner universities
- Bristol Composites Institute the largest partner/beneficiary in addition to UoN, with a duration of 7 year and kickoff in January 2017



Bristol Composites
Institute (ACCIS)

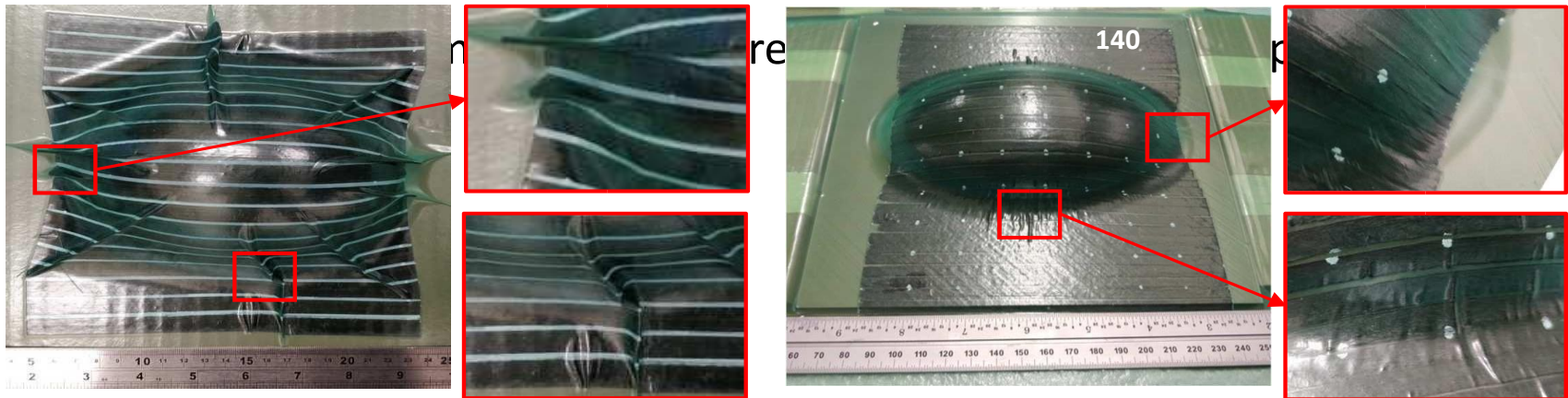


ADVANCED COMPOSITES COLLABORATION FOR INNOVATION & SCIENCE

Ongoing BCI Hub core project activity

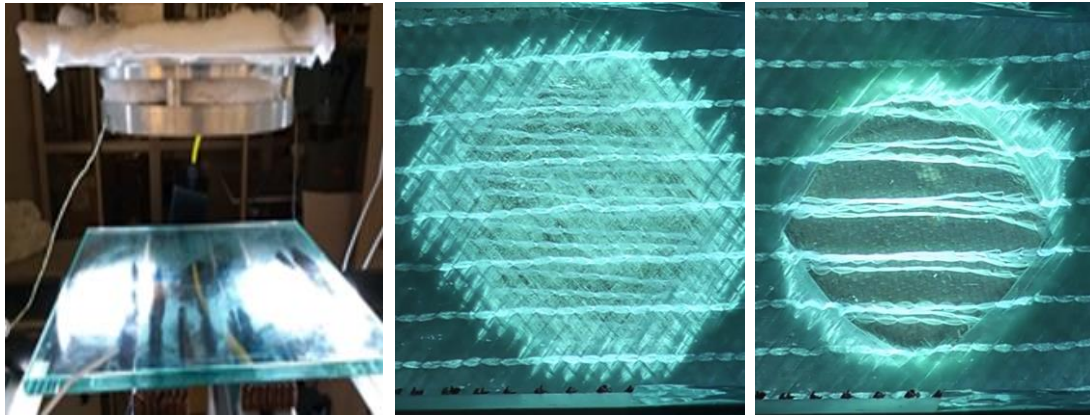
Fibre Steered Forming Technology (Hub Core project – lead BCI): 01/09/2019 to 31/08/2021

- **Industry partners:** ESI, BAE, NCC, Coriolis, GKN Aerospace, AMRC, MTC, WMG, Airbus, Rolls-Royce, Hexcel, Composites Integration, Solvay, Airborne, Heraeus Noblelight, Pentaxia, Sigmalex, Spirit Aerosystems
- **Focus:** Modify the Continuous Tow Steering (CTS) process to feed highly-aligned discontinuous fibre tapes, produced from reclaimed/recycled fibres (HiPerDiF process), to further optimise the drapeability of preforms and enable a step-change in material cost

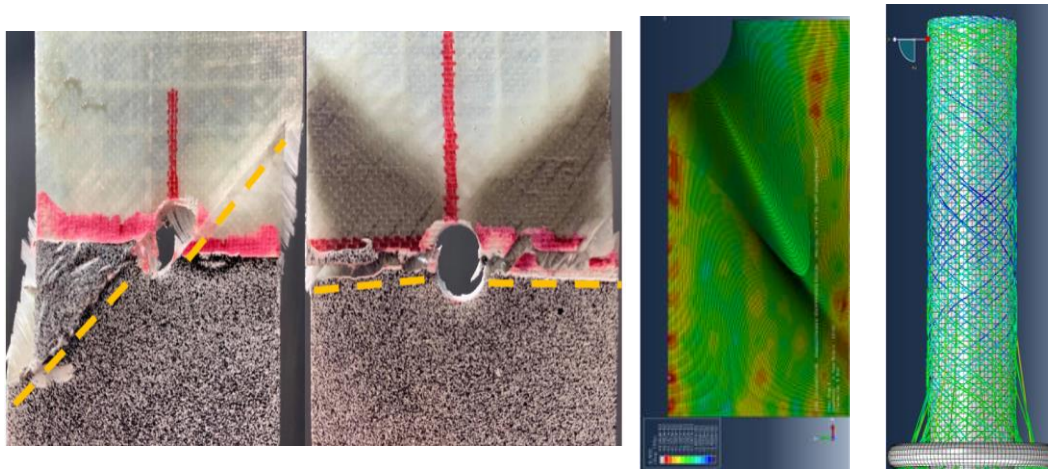


Manufacturing for Multifunctional Composites (Hub Core project – Lead ICL): 01/09/2017 to 31/08/2021

- **Industry partners:** BAE Systems, Airbus, NCC, Hexcel, Qinetiq, Chomarat, Oxeon, GKN Aerospace
- **Focus:** Structural power from supercapacitors developed through embedding structural carbon fibres in a carbon aerogel (CAG) – BCI focus on manufacturing process development and validation



Inductive curing of functionalised composite architectures



Making structural supercapacitors formable

Status & Outlook

- 2020 – difficult year (COVID-19)
- Significant and growing activity – in close collaboration with UoB colleagues from ‘Structures’ and ‘Materials’ research themes, WBRH and NCC
- Focus on fundamental/applied research & technology transfer – in close collaboration with our industrial partners
- Areas: aerospace, automotive, wind energy, construction, marine - expanding

Posters

Abstract ID	First name	Last name	Submission title
29	Matt	Etchells	DiSenC
26	Keri	Montague	Industry Engagement
25	Vincent	Maes	A Features and Defects Database for Better Composites Design
24	Iryna	Tretiak	Investigation of Thickness Springback During Compaction of Uncured Prepregs
23	Laura Rhian	Pickard	Induction Curing of Composite Panels
22	Jordan	Jones	Rapid Braid Manufacture Simulations Using SimTex
20	Sarthak	Mahapatra	Modelling steering-induced defects in automated fibre placement
16	Alex	Moss	Topological Optimization of Large, Additively Manufactured Composite Structures with a Graded Lattice Core
12	Michael	Elkington	HyVR: Hybrid Vacuum-Robotic forming
11	Narongkorn	Krajangsawadi	Highly aligned discontinuous fibre thermoplastic filaments as feedstock for additive manufacturing
9	Mario	Valverde	In-process sensing and control in AFP composites manufacture
6	Huw	Edwards	Linerless Composite Pressure Vessels
3	Mark	Turk	Manufacturing Composites with Dual Structural and Energy Storage Functions
2	Michael	O'Leary	Infusion of integrated structures with semi-cured elements