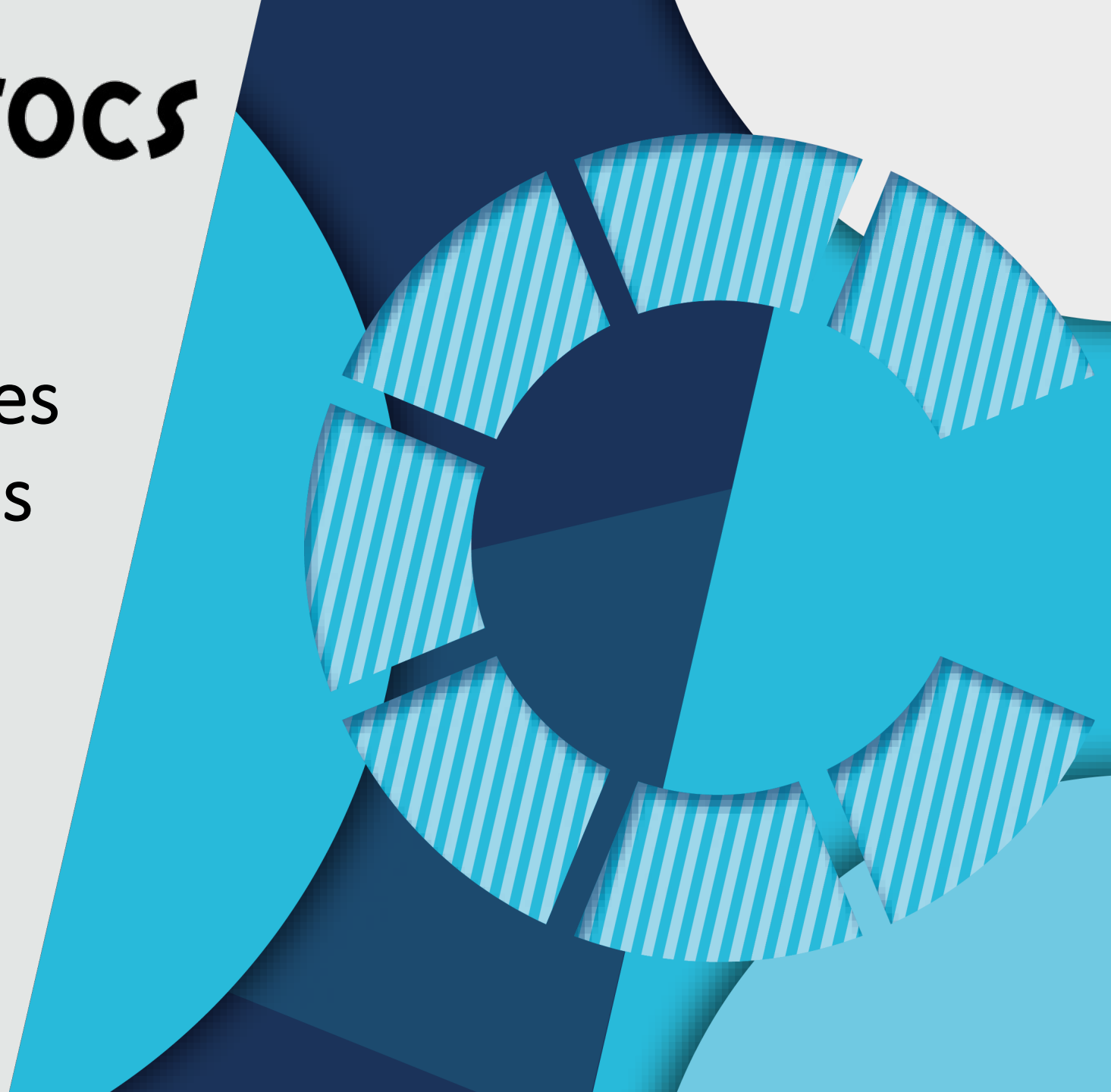


SIMulation of new manufacturing PROcesses for Composite Structures (SIMPROCS)

Stephen Hallett



Motivation

Manufacturing
understanding

SIMprocs
Composites
Process
Models

Advanced
numerical skills

Robust software
for industry
exploitation



SIMPROCS

- An EPSRC funded Platform Grant to support a **world-leading research team** that will produce **mathematical toolsets** for the numerical simulation of new and emerging **composites manufacturing processes**.
- Simulation tools to **predict the as-manufactured** configuration of composite components, allowing manufacturing **variabilities** to be accounted for during the **early stages of design**.
- ~£1.1M (£1.36M FEC) over **5 years** (+ 9month extension)



Project Partners

- Airbus
- BAE Systems
- Bombardier Aerospace Belfast
- Coriolis Composites UK Ltd
- ESI Group
- GKN Aerospace Services Ltd
- Jaguar Land Rover
- LMAT Ltd
- National Composites Centre
- Rolls-Royce plc
- University of British Columbia



SIMPROCS

- An EPSRC funded Platform Grant to support a **world-leading research team** that will produce **mathematical toolsets** for the numerical simulation of new and emerging **composites manufacturing processes**.



A world-leading research team

- Stephen Hallett
- Kevin Potter
- Ivana Partridge
- Dmitry Ivanov
- Luis Kawashita
- Eric Kim
- Carwyn Ward
- James Kratz
- Jonathan Belhoue
- Bassam El Said

Investigators

- Adam Thompson
- Ric Sun
- Kate Gongaze
- Iryna Tretiak
- Jordan Jones
- Yi Wang
- Anatoly Koptelov
- Hanna Beketova

Post-doctoral researchers

- Andrew Williams
- Matt Edwards
- Laurence Kedward

Research Software Engineers

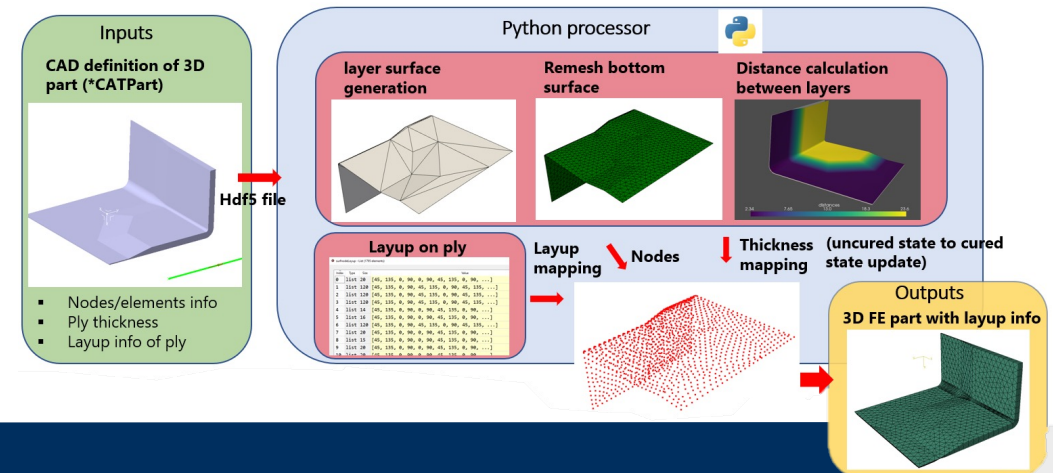
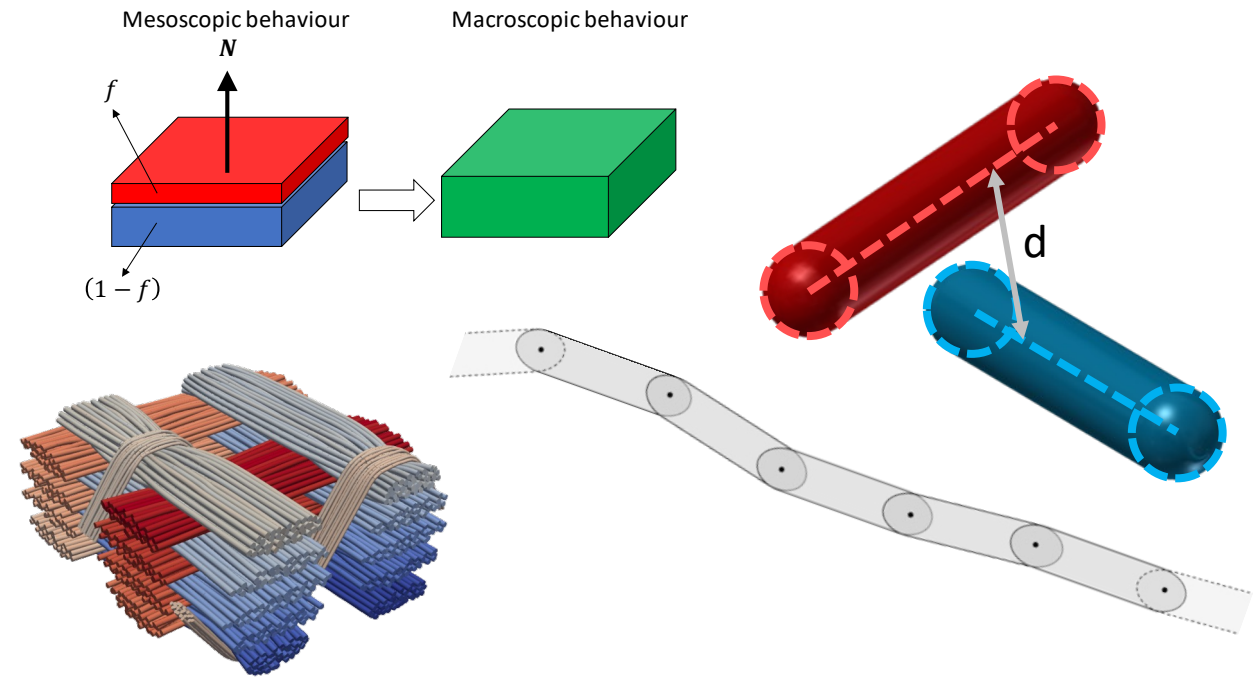


- Yi Wang
- Mark Turk
- Sarthak Mahapatra
- Maria Onoufriou
- Lachlan Williams
- Raul Gomez Quiñones
- Anatoly Koptelov
- Meng yi Song
- Burak Ogun Yavuz
- Siyuan Chen
- Hengli Cao
- James Uzzell
- Anagnostis Samanis

PhD/EngD students

Mathematical toolsets

- Abaqus subroutines
 - Material models
 - Contact definitions
- Bespoke inhouse FE solver
 - SimTex – Textile modelling
- Automated workflows
- Machine Learning Algorithms



Composites manufacturing processes

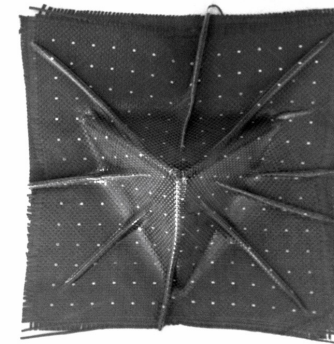
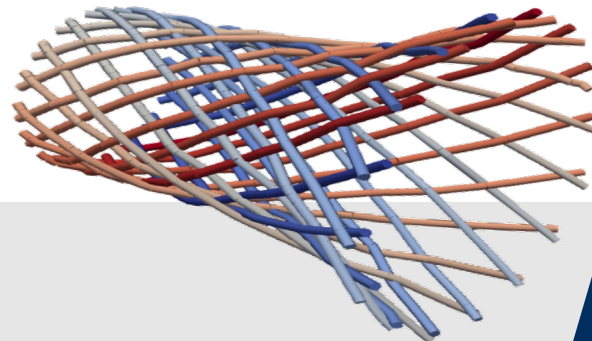
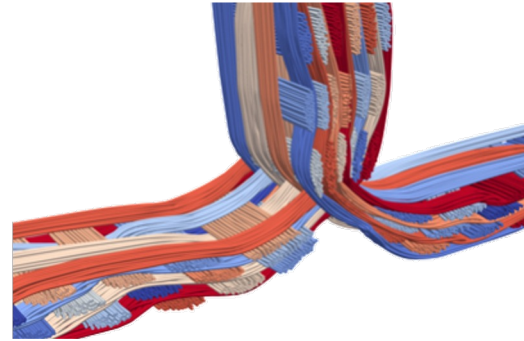
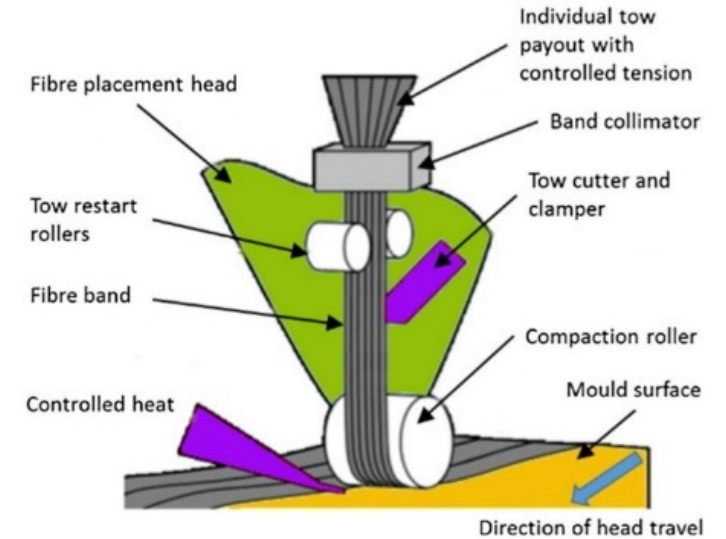
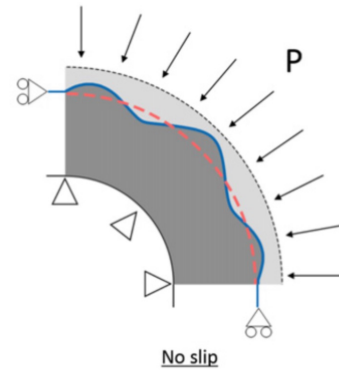
- Prepreg

- Compaction
- Automated Fibre Placement
- Cure & residual stresses

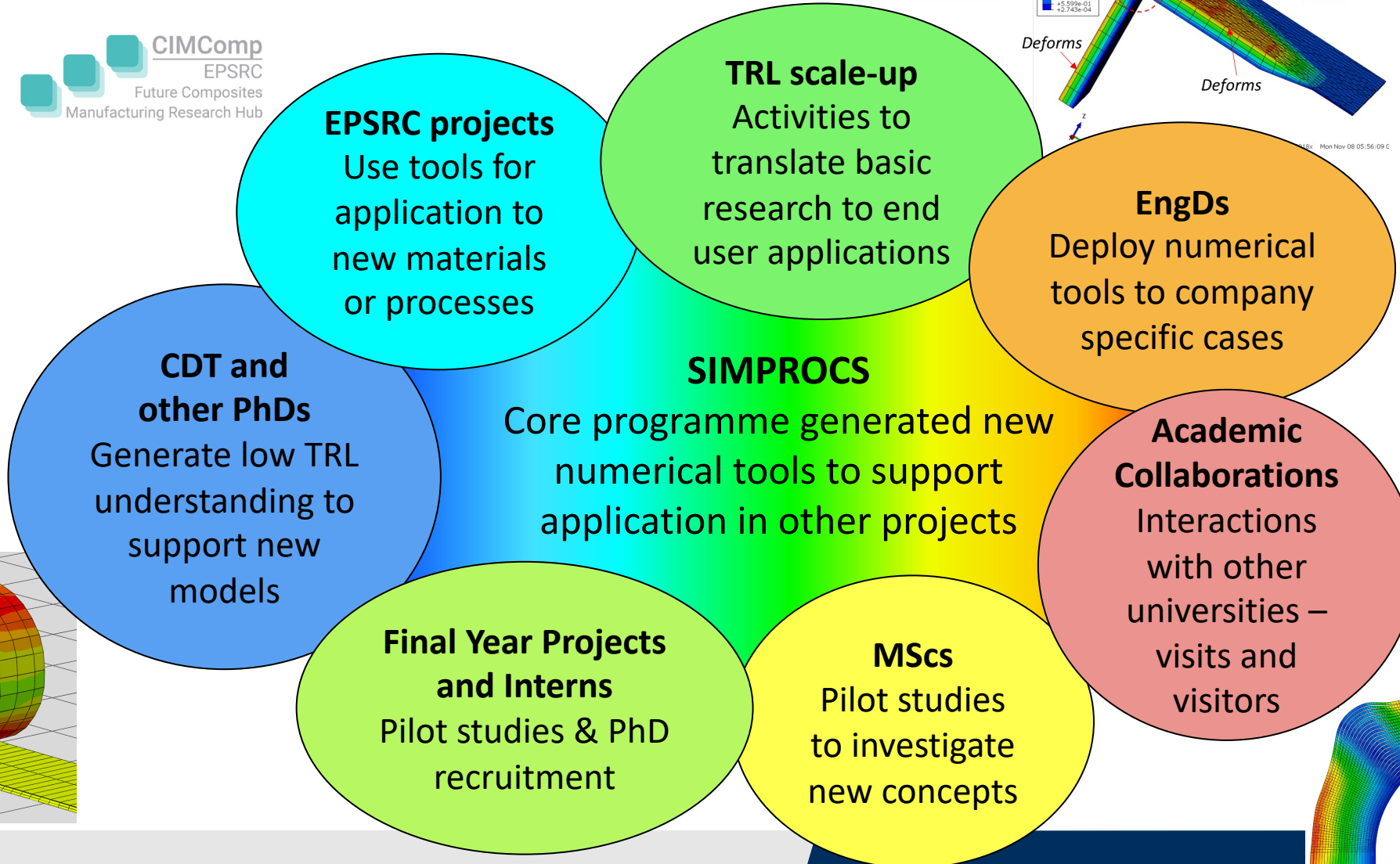
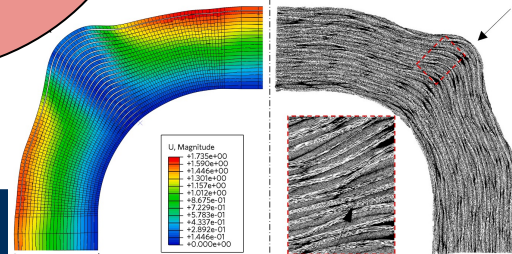
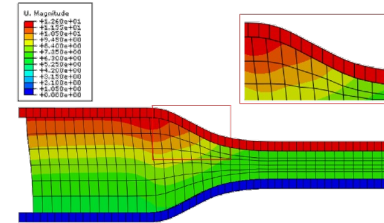
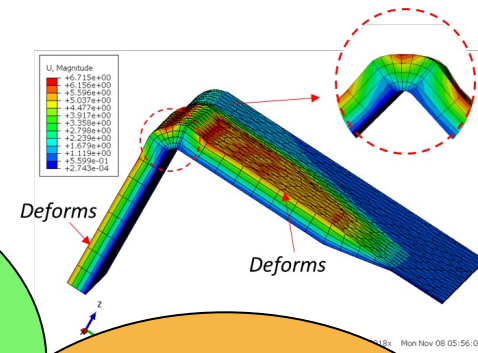
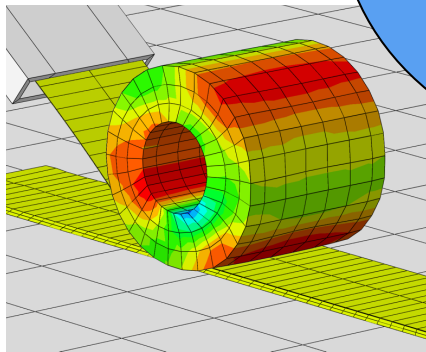
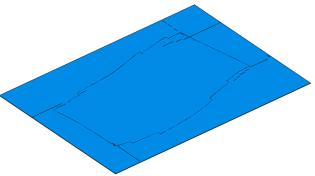
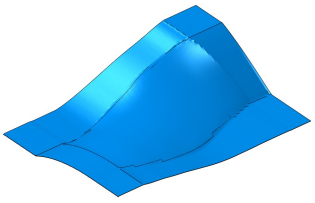
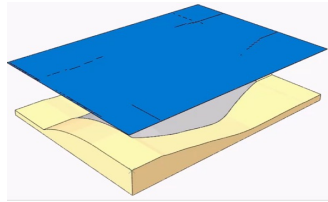
- Woven preforms

- Compaction
- Drape

- Braiding

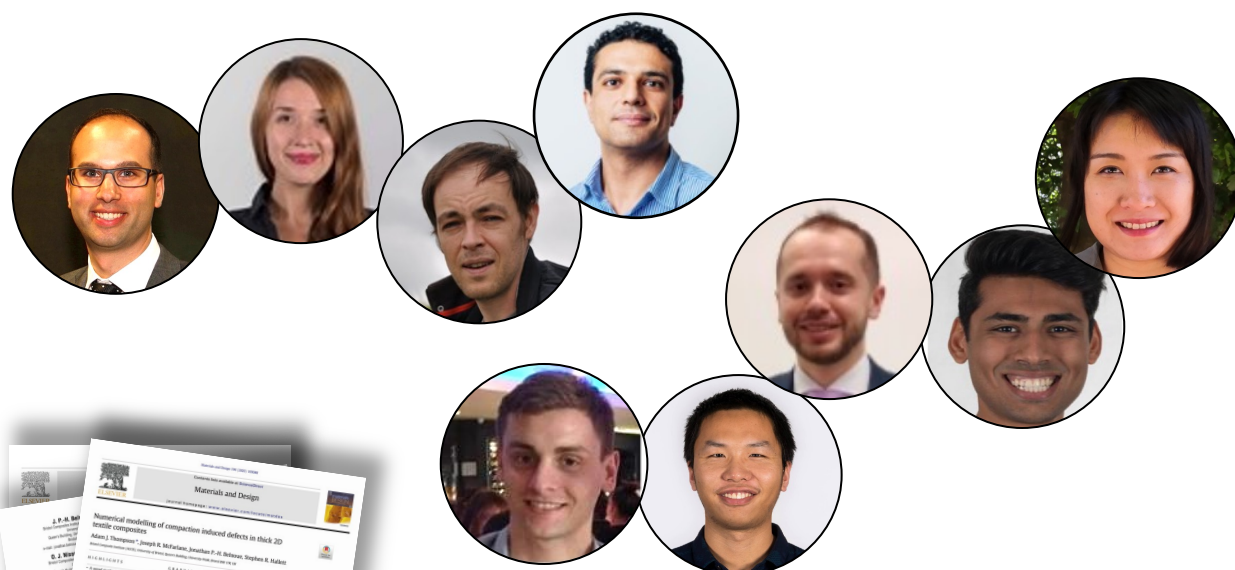


SIMPROCS as a "Platform"



Success in numbers

- People and capacity development
 - 3 RAs -> lectureships, 1 RA -> fellowship
 - 5 PhDs -> RA, team of ~15 researchers
- Papers
 - 20+ journals, 30 conferences
- Related grants
 - 16 projects, ~£2.2m value
- International Visitors
 - 7 staff/students
- Opensource Software
 - 60+ downloads/users
- Research Impact
 - 1 (out of 9) Impact Case study for UoB General Engineering in REF 2021



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REF Research
2021 Excellence
Framework

