University of BRISTOL
Bristol Composites Institute

SHEAR FAILURE OF ADHESIVELY BONDED COMPOSITE JOINTS IN A MODIFIED ARCAN FIXTURE

David J. Brearley[1], Tobias Laux[1], M'hamed Lakrimi[2], Janice M. Dulieu-Barton[1], Ole T. Thomsen[1]

[1]Bristol Composites Institute, University of Bristol, Queen's Building, University Walk, Bristol, BS8 1TR, UK

[2]Siemens Plc, Healthcare Sector, MR Magnet Technology, Eynsham, Oxfordshire, OX29 4BP, UK

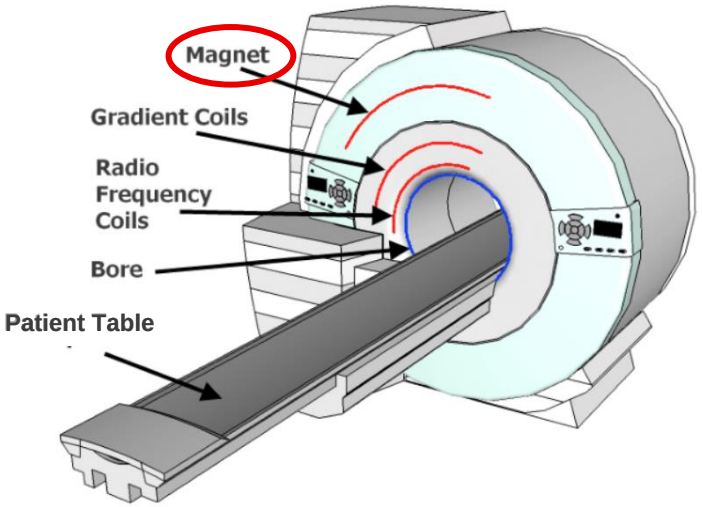
UKRI Engineering and Physical Sciences Research Council

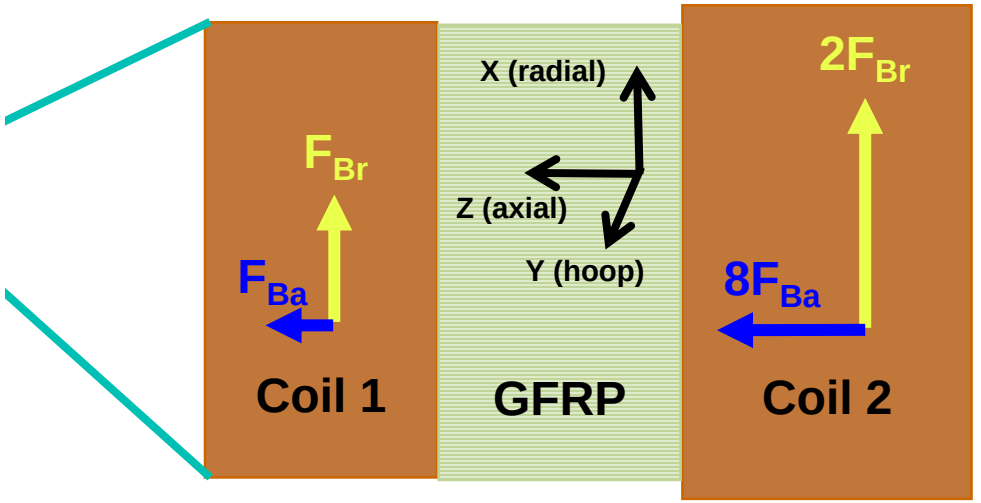
SIEMENS Healthineers

bristol.ac.uk/composites

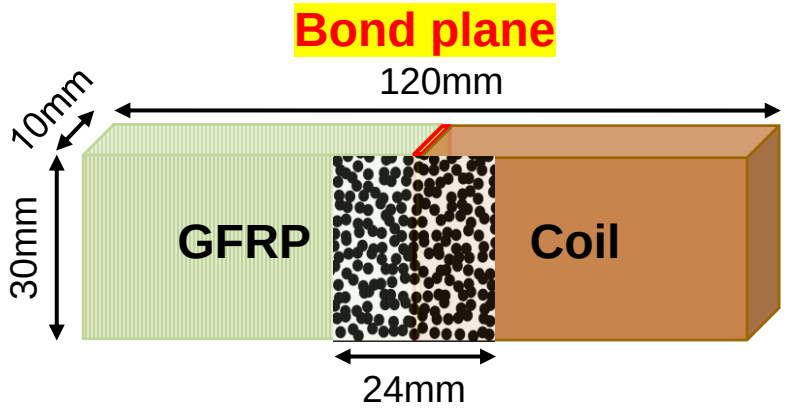
Background & Investigation

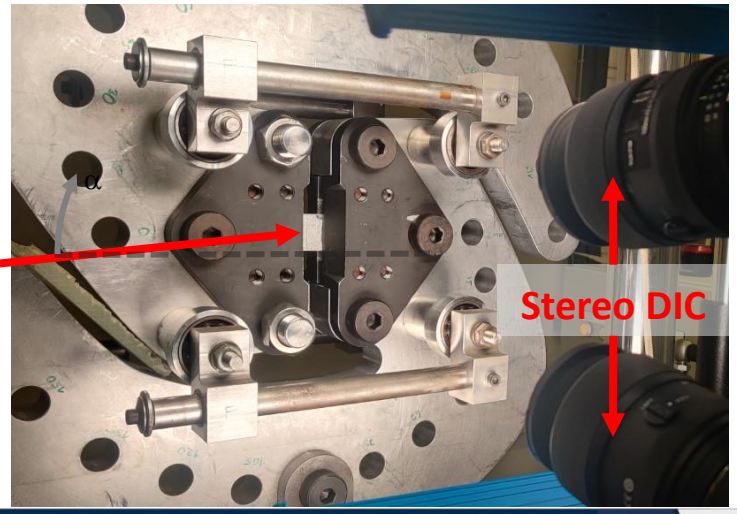
- MRI machines contain a powerful magnet
- Solenoids induce large electromagnetic forces on GFRP spacers between them in cryogenic conditions



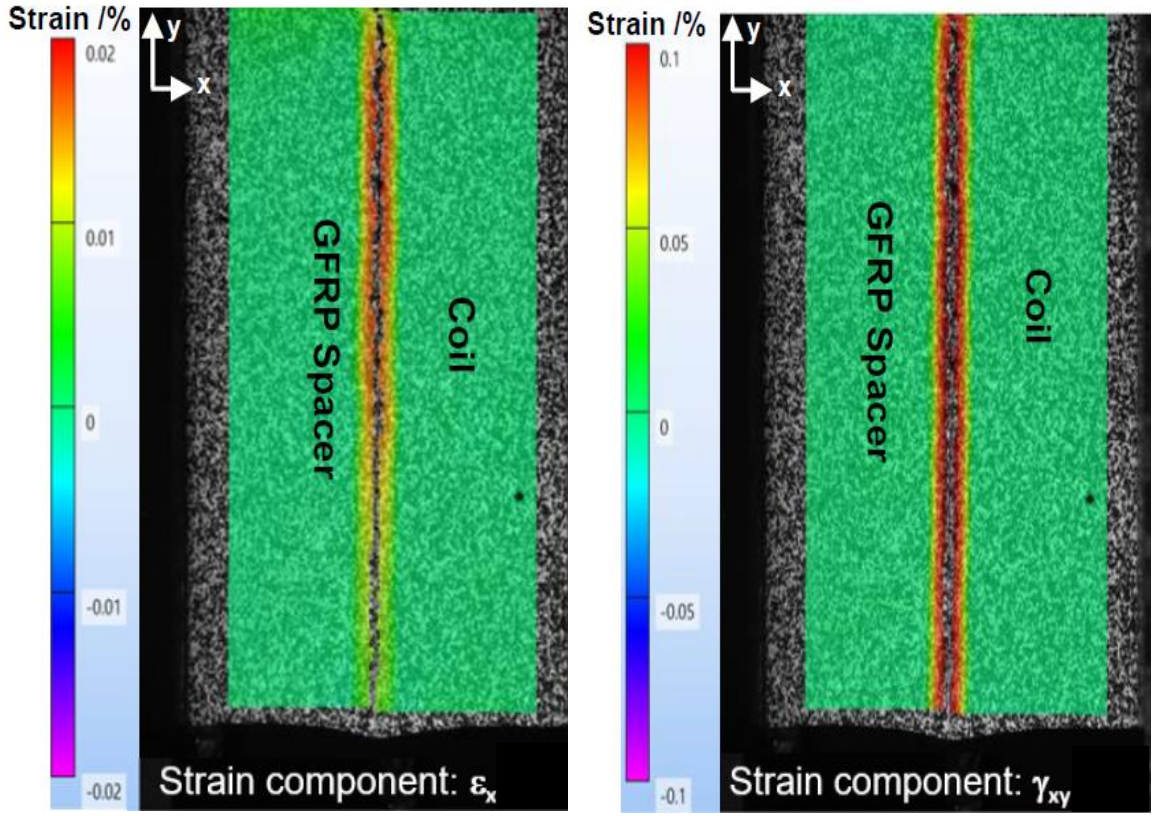


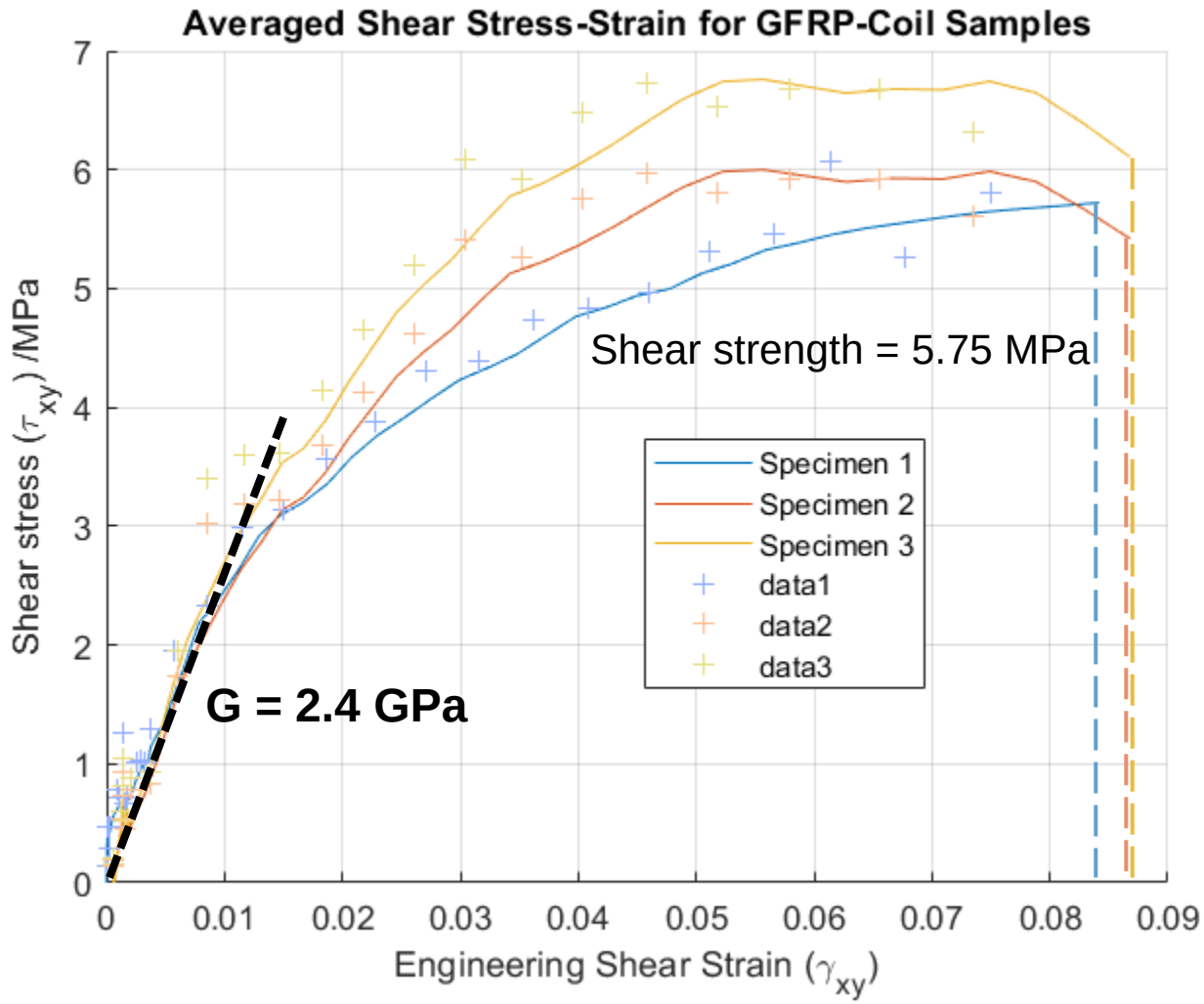
- Bonded joint identified as a potential location of failure
- Modified Arcan fixture (MAF) used to apply shear stress across specimen interface to examine shear strength





Stereo DIC results from magnet sample



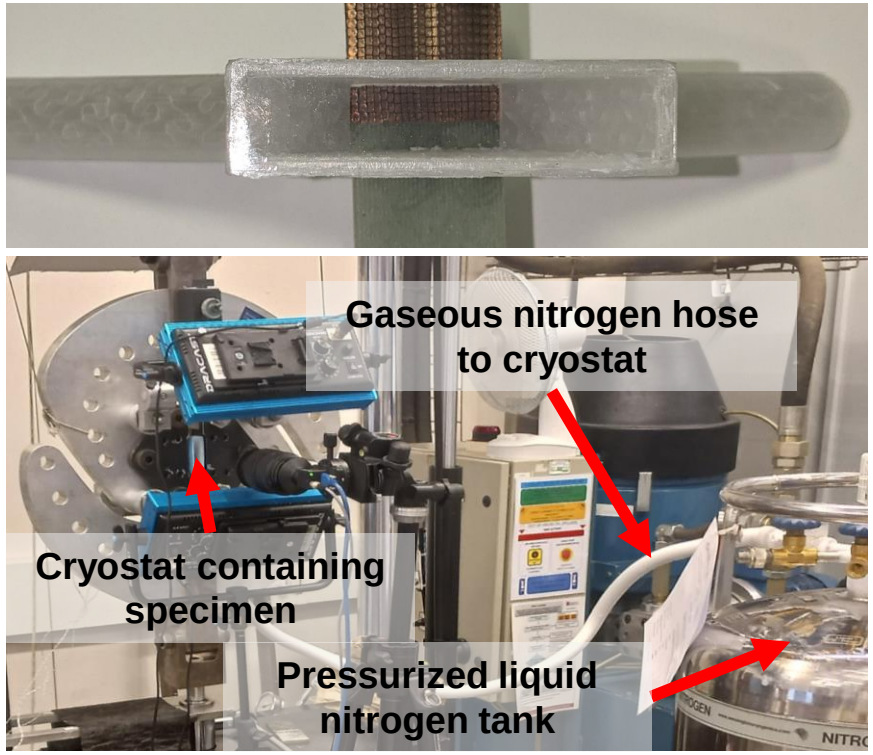


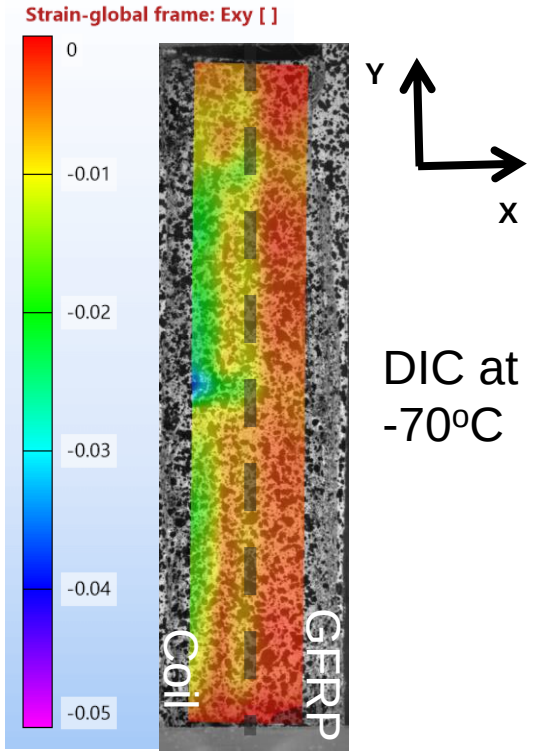
Conclusions

- MAF in shear configuration produces a uniform shear strain distribution at joint
- Measured shear modulus of 2.4GPa and average shear strength of 5.75 MPa

Future work

- Use different loading hole pairs in MAF to induce bi-axial stress states and generate failure envelope
- Repeat at cryogenic temperatures using novel cryostat





DIC at -70°C

Adhesive bond

University of BRISTOL
Bristol Composites Institute

Thank you for listening

david.brearley@bristol.ac.uk

UKRI Engineering and Physical Sciences Research Council

SIEMENS Healthineers