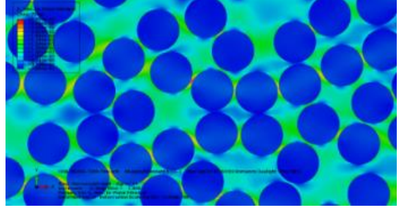
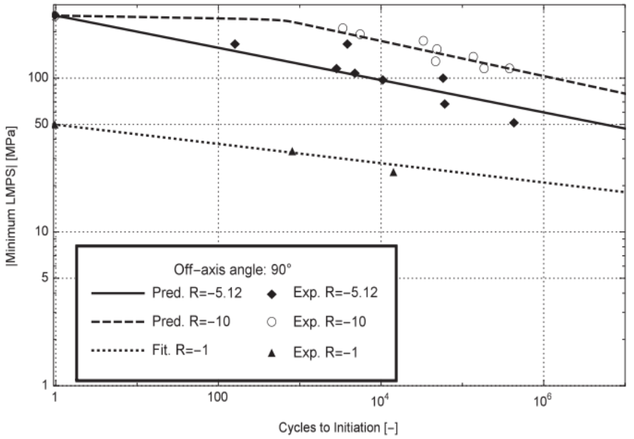
KEY AREA 2 > FATIGUE OF COMPOSITES

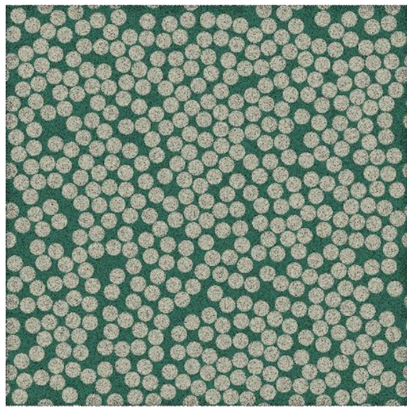


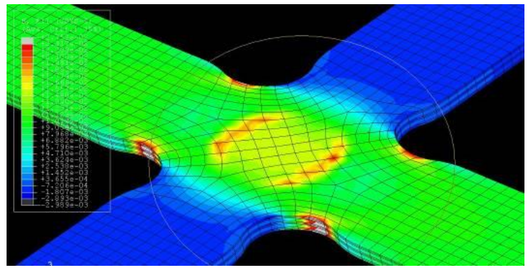
Fatigue model development

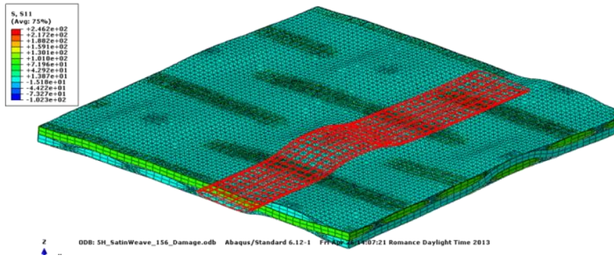
- Multi-scale modelling of fatigue damage behaviour of UD and textile composites (focus on meso-macro homogenization)
- Micro-scale modelling of initiation of fatigue damage in UD composites under variable-amplitude, multi-axial fatigue loading
- Predictive models for delamination initiation and propagation under variable-amplitude, multi-axial fatigue loading
- Thermomechanical fatigue in short fibre-reinforced thermoplastic composites
- Modelling of biaxial fatigue loading of plain cruciform specimens -> topology optimization with evolutionary strategies by combined use of Java, ABAQUS and Python scripting
- Improved models for “cycle mix” effect and “load sequence” effect in block loading
- Modelling of tabbed region and associated stress concentrations

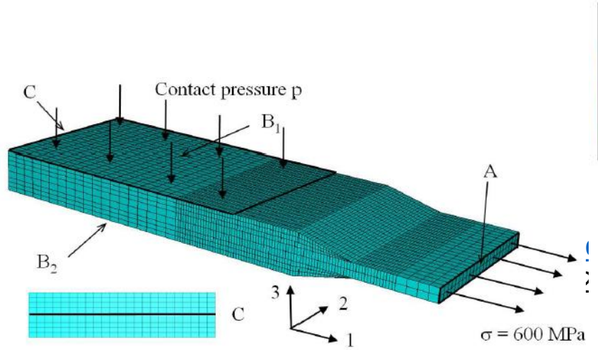


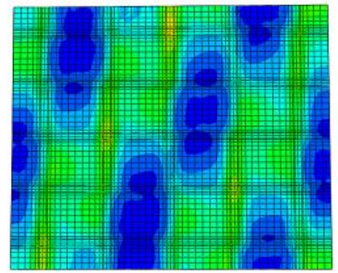
(d) TC-Combined dominated failure











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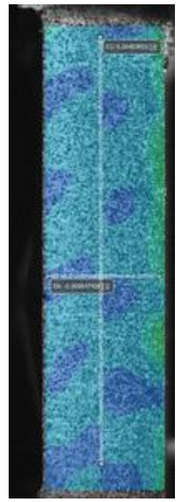
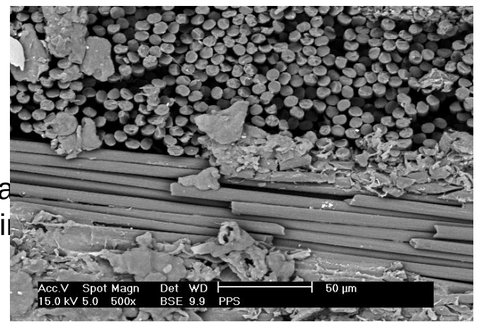
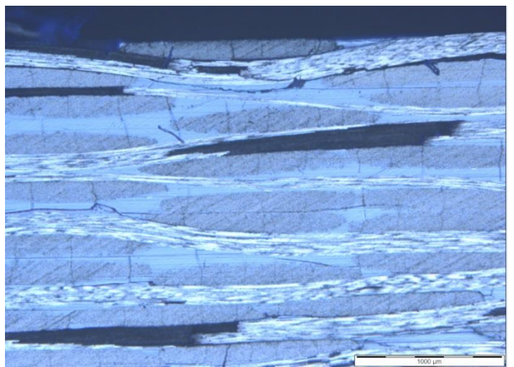
KEY AREA 2 > FATIGUE OF COMPOSITES

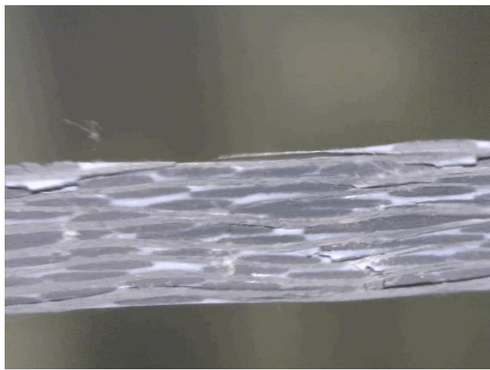
Experimental testing

- Dedicated set-ups for tension-tension, tension-compression, three- and four-point bending and three-rail shear fatigue
- Bending set-ups for fully-reversed tension-compression loading (R = -1)
- Fatigue behaviour of 5HS fabric carbon/thermoplastic composites + effect of residual stress on Poisson's ratio
- Online monitoring with resistance measurement, embedded optical fibre sensors and modified extensometers
- Accelerated fatigue testing with electrodynamic shaker
- Multi-axial tension/torsion fatigue testing with electric actuator
- Post-mortem inspection with optical microscopy and Scanning Electron Microscopy (SEM)
- Online Digital Image Correlation (DIC) measurement of full-field strains, stiffness degradation and hysteresis cycles









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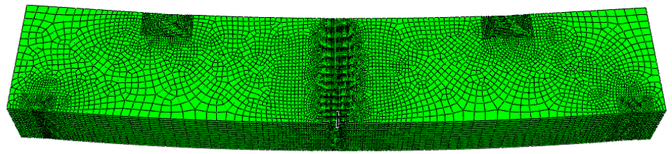
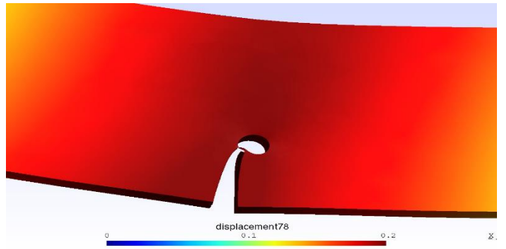
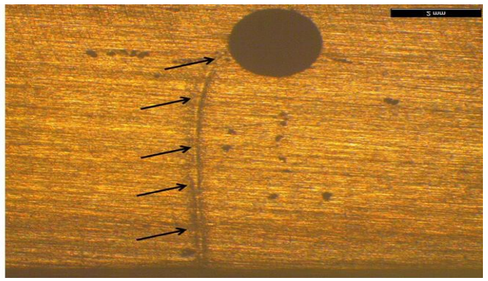
KEY AREA 2 > FATIGUE OF COMPOSITES

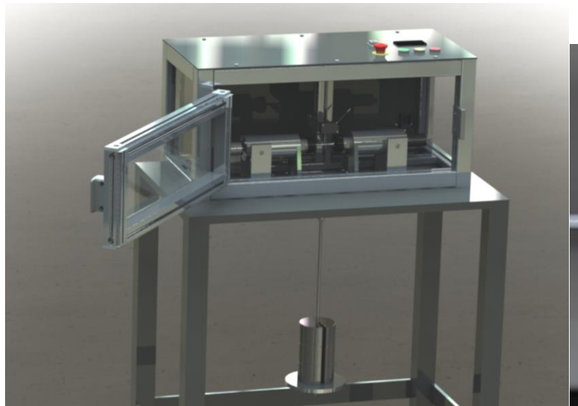
3D printed materials

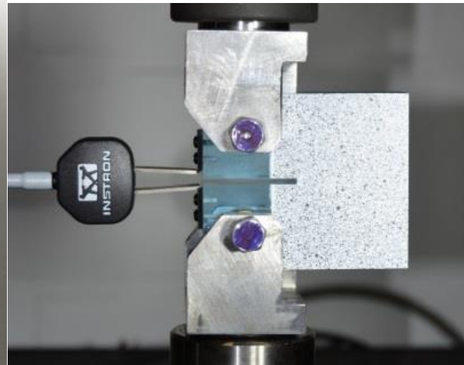
- Fatigue characterization of 3D printed polymers for use in patient-specific ankle-foot orthoses
- Simulation of fatigue crack growth in additively manufactured metals (titanium, stainless steel)
- Rotating bending fatigue for very fast fatigue testing of 3D printed metals
- Bending and tension-tension fatigue of individual struts of lattice/cellular structures











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