

Workshop on Experimental Mechanics

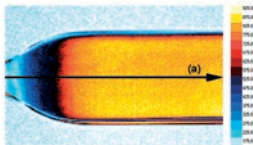
Monday 27th March to Friday 31st March 2017

Venue: Highfield Campus, University of Southampton, UK.



Chair: Professor Janice Barton

'Experimental mechanics' can be defined as the investigation by experimental means of the mechanical behaviour of engineering systems subjected to load. The system can be a structure, a material, soft matter such as human tissue, a fluid-structure coupling; the list is practically endless. Implicit in the definition is that some kind of measurement system is used to capture a quantity that describes the system's behaviour. The main attributes conventionally associated with experimental mechanics are the deformation and the mechanical strain. These can then be related to a failure parameter by deriving the stresses from the strains by knowing the material constitutive relationships. Experimental mechanics approaches that provide a measure related to the strain are therefore very important design tools. Many of these techniques have been available for decades but recently have been gaining popularity because of the advances in computing power and decreasing hardware costs. More importantly from the design perspective, the necessity for experimental data to validate numerical models of systems manufactured from complex nonlinear inhomogeneous materials, such as fibre reinforced polymer composites, is ever increasing. Experimental mechanics approaches have much to offer and it is the purpose of this workshop to provide an overview of the range of application and operation of the techniques.



UNIVERSITY OF Southampton

The aims of this workshop are to:

- Provide an in-depth understanding of experimental mechanics approaches
- Introduce participants to testing procedures
- Provide detailed knowledge of the application of point measurement techniques such as electrical resistance strain gauges
- Provide a detailed knowledge of modern full field techniques such as Thermoelastic Stress Analysis (TSA), Digital Image Correlation (DIC), and Grid Methods
- Understand how the data from experimental techniques are manipulated to validate numerical models
- Introduce high speed imaging



Workshop lecturers

Professor Janice Barton,
University of Southampton

Professor Fabrice Pierron,
University of Southampton

Professor Simon Quinn,
University of Southampton

Dr Rachael Tighe,
University of Southampton

Dr Duncan Crump,
University of Southampton

Dr Andrew Robinson,
University of Southampton

Dr Jerry Lord, *NPL*

Dr Dave Hollis, *LA Vision*

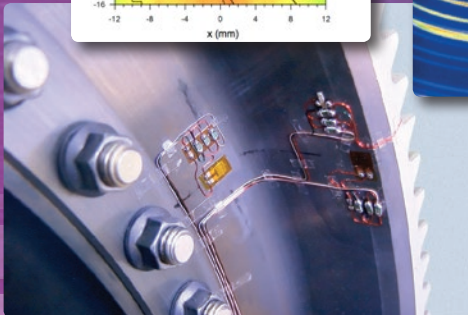
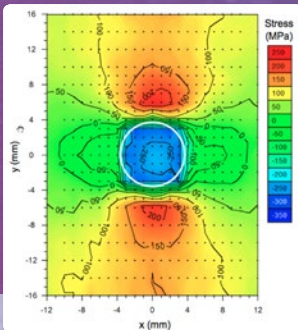
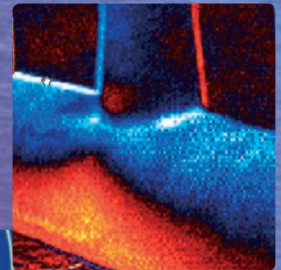
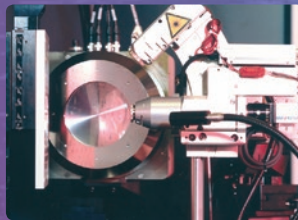
Mr Anton Chithey, *Vishay*

Mr Peter Fuller, *Instron*

This workshop is aimed at postgraduate students conducting research in experimental mechanics and practitioners wishing to update skills and research scientists requiring a broad overview of the topic.

The participants are expected to have a basic knowledge in mechanics. The course is aimed specifically at PhD students, but the course is also recommended for industrial engineers and scientists.

Certificates will be issued on the basis of course participation.



Workshop timetable

Breaks: Morning 11.00-11.30 Lunch: 13.00 to 14.00 Afternoon 15.30-16.00

Monday 27 March - Mechanical Testing Procedures

- 08.30** Registration and Coffee
09.00 Lecture 1: Registration and Overview
10.00 Lecture 2: Test Machine Principles
11.30 Lecture 3: Strain Gauges
14.00 - 18.00 Laboratory Sessions on Strain Gauges and Mechanical Testing

Speakers - Barton, Quinn, Fuller, Chithey, Crump, Robinson

Tuesday 28 March - Digital Image Correlation and other White Light Techniques

- 09.00** Lecture 4: White Light Imaging
11.30 Lecture 5: Digital Image Correlation and Grid Techniques
14.00 Lecture 6: Metrology and Uncertainty Quantification in DIC
16.00 - 18.00 Laboratory Sessions on Camera Set-up and Digital Image Correlation

Speakers - Barton, Pierron, Hollis, Crump, Robinson

Wednesday 29 March - White Light Data Analysis and Processing

- 09.00** Lecture 7: Data Analysis and Filtering
11.30 Practical Session on DIC Processing
14.00 Lecture 8: Virtual Fields Method
16.00 - 18.00 Practical Session on Data Processing

Speakers - Pierron, Hollis, Crump, Robinson

Thursday 30 March - Infra-red Techniques

- 09.00** Lecture 9: Infra-red Imaging
10.00 Lecture 10: NDE applications of infra-red thermography
11.30 Lecture 11: Thermoelastic Stress Analysis
14.00 - 16.00 Laboratory Sessions on Infra-red Techniques
16.30 - 18.00 Course party

Speakers - Barton, Pierron, Crump, Robinson, Tighe

Friday 31 March - Closing Sessions

- 09.00** Lecture 12: High Speed Imaging
10.00 Lecture 13: Electronic Speckle Pattern Interferometry
11.30 Practical Session on Infra-red Data Processing
14.00 Industrial Applications
15.00 Wrap-up and Close

Speakers - Barton, Lord, Quinn, Pierron

Venue information

The University of Southampton is located on the South Coast of England and is one of the leading research universities in the UK achieving consistently high scores for its teaching and learning activities. There are currently nearly 20,000 students and 5,000 staff based across several campuses in Southampton and Winchester. The discipline base is broad, encompassing all the major academic subjects, but there is also a unique commitment to innovation, which is evidenced both in research and scholarship at the leading edge, and also in pioneering new approaches and techniques.

The workshop will take place at the main Highfield campus and is hosted by the Faculty of Engineering and the Environment (FEE). FEE has extensive laboratory and experimental facilities.

Staff work at the forefront of their disciplines. It has strong links across the University and, because of its diverse nature, is able to offer a multi-disciplinary approach to all its research and teaching activities as well as its interactions with industry.

Southampton has its own international airport, so the city is within easy reach of Europe, with good connections to cross-channel ferries and the Eurostar rail service. The city has regular train connections from all main UK centres and is also easily accessible via road. Southampton is within easy reach of London by train and coach. For further details about how to get to Southampton and the University please visit the University of Southampton web site.

www.southampton.ac.uk/visitus/campuses/highfield.html

Booking information

Please complete and return to:

BSSM, PO Box 839, Flitwick, Bedford, MK45 9DU

Tel: 07756 915 295 or from overseas +44 (0) 7756 915 295 email: info@bssm.org

The workshop has limited spaces and places will be allocated on registration.

Name: _____

Institution: _____

Address: _____

Postcode: _____

Tel: _____

e-mail: _____

Fees (plus VAT)

EU (including UK) Students £250 Non-EU Students (not studying in the UK) £650

Student rate only available for full participation.

Industrial delegates £950 Industrial delegates (members of BSSM) £880

I wish to attend Day 1 £300 Days 2 and 3 £600 Day 4 £300

Payment by cheque, credit/debit card (not AMEX) or invoice

Please make cheques payable to British Society for Strain Measurement; for payments by invoice please quote a purchase order reference number.

Please invoice: Purchase order reference:

Card No:

Start date: / Expiry date: / Issue No. (Switch/Maestro only):

Security code (last three digits on back of card):