In essence, it is a Meeting about understanding deformation, cracking and damage evolution and coming up with ways of making failure prediction of material and engineering structure: from empirical methods to mechanism modelling; and from continuum analysis to high-fidelity damage simulations that serve as virtual tests of structural integrity across the widest of size scale.

www.sheffield.ac.uk/compositesconference
Developing novel materials is a demand for materials of structural integrity that work reliably and safely at the frontiers of cutting edge technologies. History is littered, however, with structural failures where the crucial fracture process eluded the experimentalist. Predicting precisely where a small crack will develop in a material under stress and exactly when in time catastrophic fracture of the structure will occur is an unsolved mystery in the design and building of large engineering structures. It is when structural integrity of the material is lost that disaster strikes!

Structural integrity is a term that treats the design, the materials used, and figures out how best components and parts can be joined:

- by embracing materials science & mechanics,
- by understanding fabrication technology,
- by coming to grips with NDT, service monitoring, & safety management,
- by multi-scale modelling of fracture and damage mechanics & probabilistic failure.

When human life depends upon engineering ingenuity, SI is an essential design requirement.

Materials have to be processed, components shaped, and structures assembled. Lack of attention to detail leads to premature failure because of the introduction of fatal flaws and they all impact on structural performance.

Fitness considerations for the long-life of highly-loaded structures requires an in-depth understanding of critical phenomena such as:

- fatigue & stress corrosion cracking, and
- impact (blast, shock, ballistic, tyre debris impact, bird-strike).

A modelling strategy is required to devise a robust life prediction methodology that is successfully predictive of: reliability, life expectancy, and durability of safe structure.

Successful prediction requires detailed information obtained from test programmes of all possible failure mechanisms across the widest spectrum of size-scale that operate in service.

Multi-scale problems of structural failure can be solved by testing and analysis across a size spectrum. Understanding structural behaviour at the various size scale requires dexterity in manipulating the working tools of the designer: empirical analyses (mathematics and continuum modelling) or continuum mechanics, mechanism models (micro-mechanical models) or micro-mechanics, tools that determine constitutive equations based on of the rules of material behaviour.
The Tony Kelly Dinner
To mark the 85th Year of Professor Tony Kelly, a special Banquet will be held in his honour.

Registration and Pricing
This will be £525 with special student fee of £375 (inc. all refreshments, lunches, dinners, welcome reception, Banquet and wines). The spouse/partner ticket for all meals, welcome reception, Banquet & wines will be £275. College accommodation, single room en suite B&B for the three nights of the conference including English breakfast will be £330. Additional Banquet dinner will be £95. Information about the ways of payment will be provided on the conference website: www.sheffield.ac.uk/compositesconference

Contributions in these areas are encouraged
- Analytical, experimental, numerical modelling
- Predictive design codes based on physical, numerical, and computer simulation
- Modelling of deformation & fracture mechanisms
- Nano-composite mechanics, interfaces
- Textile composites: theory & experiment
- Fracture and damage (tolerance) mechanics
- Impact, crashworthiness, and energy dissipation
- Stiffness tailoring
- Enhanced buckling concepts
- Multiscale modelling (theoretical, experimental)
- Implementation of M$ modelling
- Reliability, durability, and safety issues
- Damage, self-healing and repair
- Damage sensing and smart systems
- NDT, NDE and health monitoring issues, SHM
- Evaluating, qualifying, assessing, certifying
- Stress and temperature-related behavioural phenomena & structural changes over time
- Lifetime (residual strength) prediction
- Bio inspired materials and systems
- Multifunctional structures and materials
- Recycling, Green issues

Call for Papers and Deadlines
Please submit a 2-page abstract to the conference secretariat (cambridge@sheffield.ac.uk) by 5th November 2012. The authors will receive notification of acceptance by 30th November 2012. An updated abstract for inclusion in the conference proceedings is required by 1st February 2013. Early bird registration fee deadline is 1st March 2013. Authors are also invited to submit a full-length paper for publication in special issues of CSTE, PRC and ACMA after the conference.

The Colloquium language will be English, which will be used for all presentations & written material. Regular updates can be found on the web: www.sheffield.ac.uk/compositesconference
Registration Form

DFC12/SI6  Designing Composite Materials: Avoiding Large Structural Failures
8-11 April 2013
Queens’ College, Cambridge University, UK

Endorsed by IoM³, RAeS, ESCM and IMechE

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Or submit abstract by emailing MS Word or PDF two page documents to:
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Contact:
Dr Andrew Gill (Conference Secretary)
Email: cambridge@sheffield.ac.uk
Composite Systems Innovation Centre
Department of Mechanical Engineering
The University of Sheffield
Mappin Street, Sheffield, S1 3JD, UK
Conference Tel No: +44 (0) 114 222 7720
Conference Fax No: +44 (0) 114 222 7890

Welcome to Cambridge!

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