Report on 14th Simonet Seminar held on November 15th 2006

1. HSE concerns on Integrity Management of Offshore Corrosion, Andrew Duncan, HSE

The presentation covered amongst other things the reasons why HSE is concerned about corrosion management of offshore installations; it outlined the content of a recently published external corrosion guidance for HSE inspectors; highlighted fabric maintenance issues; discussed some of the corrosion related industry initiatives and the future HSE agenda concerning corrosion management.

2. **Monitoring residual stress decay, Shisong Ngiam, UCL**

To follow

3. **Load monitoring of FPSO mooring chains, Nick Stone, TSC Inspection Systems**

To follow

4. **IRIS-RMS Riser Monitoring System, Donogh Lang, Alan Dougan, MCS/Fugro**

The talk described the IRIS RMS (Riser Monitoring System) which is an advisory system for deepwater drilling risers. It combines measurements of deepwater riser response parameters with a state-of-the-art finite element model to accurately determine the 3D riser response to a wide range of loading scenarios, including transient events, such as vessel drift-off. This is achieved by the incorporation of MCS' industry-leading riser analysis software Flexcom and Freecom in the RMS analysis engine.
A key advantage of the RMS is its ability to improve operational safety. The IRIS RMS achieves this by providing both an accurate record of riser joint usage (including fatigue damage) on a joint-by-joint basis, and a predictive riser response capability. This allows management of the riser components in such a way so as to maximise riser integrity, and has the further advantage of reducing unnecessary drilling down-time.

5. **Crack monitoring for bridges, Mike Smith, TSC Inspection Systems**

To follow

6. **A non-intrusive guided wave method for detecting blockages in pipes,**
Mike Lowe, Imperial College

To follow

7. **Non invasive detection of buried mineshafts, Francis Drossaert, Edinburgh University**

To follow

8. ACLAIM, Richard Lee, ESR

The presentation described the ACLAIM project (Advanced Composite Life Assurance and Integrity Management, www.aclaim.uk.com) which is one of several that DTI has funded through its Technology Programme. This is aimed at developing an integrated structural health management framework to assess the integrity of Composite Structures. The primary objective is to provide an integrated approach that includes detection techniques (embedded), assessment procedures and guidance documentation to;

- Increase confidence in the use of composite materials in safety critical components and structures through improved inspection schemes
- Minimise in-service structural or component failures through improved understanding of the influence of defects and damage on residual life
- Lower maintenance costs through remote monitoring and analysis based on cost effective and novel multi-functional sensors.

ACLAIM is driven by an industrial steering group comprising asset owners, sensor equipment and composite component suppliers and regulatory bodies. This group includes diverse industry sectors ranging from power generation (wind, wave, conventional), off-shore oil and gas, through to major UK infrastructure (buildings, bridges) owners. Industry relevance has been ensured through selection of asset owners who are applying or wish to apply Composite Structures with the focus on construction or infrastructure in its many forms, e.g. offshore, chemical, power (wind turbine blades) and repair to infrastructure.
The consortium is led by ESR Technology Ltd (ESR) in partnership with the National Physical Laboratory (NPL), Mitsui Babcock Energy Limited (MBEL) and Deepsea Engineering and Management. The consortium includes several industrial partners and also incorporates a EPSRC project involving Strathclyde and Birmingham Universities.

ACLAIM is divided into 9 linked Work Packages or Tasks, 5 Case Studies and an EPSRC project. A flowchart was presented indicating the linkage between the Project Tasks, the Case Studies and the EPSRC project.
Case Studies relevant to the Industrial Partners include:
• Wind turbine
• Bridge rehabilitation
• Pressure containment
• Data acquisition
• Piping repair

These 5 case studies last the duration of the project and ensure that the activity of each work package is directly linked to an industrially relevant problem.

9**. Non-Destructive Detection of Corrosion in Steel Reinforcement, Matthew Hocking, SciSite Ltd**

To follow

10. **A novel optical method for monitoring the initiation and propagation of disbonds in bonded composite joints without disrupting the bond line ,Steve Ogin, Surrey University**

Bonded joints, consisting of composite-composite or composite-metal joints, are used in various industries. The advantages of using bonded joints, as opposed to mechanically fastened joints, include weight saving and the avoidance of stress concentrations around holes. The difficulty with bonded joints is, of course, that the joint cannot be disassembled and structural health monitoring of joint integrity is difficult.

In this presentation, a new method for monitoring composite bonded joints using a sensor based on a chirped fibre Bragg grating (CFBG) was described. The CFBG has been embedded within a shear lap joint manufactured using transparent glass fibre reinforced plastic (GFRP) adherends, and the transparency of the model joint allows a simple comparison to be made between the growth of the disbond and changes in the reflected spectrum of the CFBG. The joint has been subjected to a fatigue loading which both initiates disbonds between the adherends and then causes the disbonds to grow stably. The results show (a) that the initiation of a disbond can be detected, and (b) that the position of the disbond front can be determined to within a few millimetres. ”

11**. Mesh Radio Sensors for Remote Asset Monitoring, Matt Britton, Sensornet Works**

Recently, the potential of mesh radio sensors has been recognised for the monitoring of homes, factories and other assets. Mesh radio sensors offer the potential to monitor large areas cheaply, reliably and with economics that are not feasible with other methods such as cabled installations or manual methods. In this talk, the challenges of using mesh radio sensors for monitoring remote or hazardous environments were discussed, including plans to use such systems in applications such as off-shore assets and transport infrastructure.

12**. GRID, Colin Taylor, Bristol University**

The Engineering Faculty at Bristol University has recently opened its new £20m integrated dynamics and materials laboratory known as the Bristol Laboratories for Advanced Dynamics Engineering (BLADE). These laboratories have brought together all the dynamics and materials experimental facilities from the Aerospace, Civil, Electrical and Electronic, Mechanical, Computer Science and Engineering Mathematics Departments to form a shared, integrated facility.
BLADE has a wide portfolio of equipment, including the EPSRC Earthquake Simulator (or shaking table) housed in a purpose designed 4-storey test hall, a 2-storey test hall for small to medium sized specimen testing (e.g. a Lynx helicopter), reaction walls and strong floors, static and dynamic test machines ranging from 3t to 600t capacity, a new geomechanics laboratory, and a purpose designed advanced control and test laboratory. Up to 80 researchers from across the disciplines are accommodated in shared open plan offices in order to promote multi-disciplinary working. At the end of 2006, BLADE will be augmented by the University's new £3m supercomputer. This will allow the integration of state-of-the-art numerical and large-scale physical modelling, with an emphasis on non-linear dynamic systems.
BLADE has recently been funded by EPSRC to 'Grid enable' the laboratories by connecting them to the $200m US Network for Earthquake Engineering Simulation (NEES). Working with partner laboratories at Cambridge and Oxford Universities, BLADE will create UK-NEES by connecting the three laboratories to NEES using the high performance computational Grid. This will enable real-time collaboration, data sharing and synchronised experiments with partners in the UK, USA, Europe and world-wide. Remote researchers will be able to participate directly in experimental programmes (even in some cases remotely controlling experiments) through advanced video-conferencing and data interactivity facilities. Data will be streamed in real-time to remote locations and archived in a common data repository. UK-NEES is currently under construction and will be fully operational towards the end of 2007.
The talk gave an overview of the BLADE and UK-NEES concepts and activities.