

A FESI Continuous Professional Development Seminar  
in association with SIMoNET and RCNDE



## Structural Integrity Monitoring: Its Role in the Structural Integrity Assessment Process

5 April 2011

Royal Academy of Engineering, London

Chairman: Professor Peter Flewitt, University of Bristol

### Programme

09:00	<b>Registration and Coffee</b>
09:30	<b>Introduction</b> Peter Flewitt
09:40	<b>Monitoring and Evaluation of Components and Structures for Integrity Assessment: Their Value in Expert Witness Evidence</b> Iain Le May, MCS Ltd
10:20	<b>Offshore Life Extension – An Overview</b> John Sharp, Cranfield University; Alex Stacey, HSE; Philip May, Atkins
11:15	<b>Civil Infrastructure</b> Brian Bell, Network Rail (Transport); Alan Hodder, National Grid (Utilities)
11:55	<b>The NDE Role</b> Keith Newton, RCNDE; John Taggart, Serco
12:30	<b>Fit for Purpose</b> Mark Stone, Sonomatic
14:00	<b>Monitoring Large Structures – Research Developments</b> Paul Fromme, UCL
14:30	<b>Investigating the Built Environment – Non Destructive Options</b> Simon Brightwell, Fugro-Aperio
15:00	<b>Wind Energy</b> Feargal Brennan, Cranfield University
15:40	<b>An Overview of the IMAJINE Project: Monitoring Joint Integrity</b> Richard Lee, ESR Technology
16:10	Open Discussion
16:45	Close

### Introduction

The purpose of the seminar was to show how structural integrity monitoring and NDE methods can be applied to structures and components for a wide range of industrial applications, and how these are being developed to meet increasingly stringent legislative demands and challenging operating conditions. The seminar addressed:

- The interpretation of monitoring data for enabling life extension
- The role of SIM / SHM / NDE in overall safety and integrity strategies
- How monitoring data helps to support the predictions and analysis derived from structural integrity and materials modelling

### The Open Discussion

Professor John Sharp thanked Professor Flewitt for chairing the day's programme and introduced the open discussion element of FESI's CPD Workshop by inviting Paul Fromme, on behalf of SIMoNET, and Poul Gosney, for FESI, to give brief statements about the aims and activities of the respective organisations. (Note: For further information on SIMoNET see [www.simonet.org.uk](http://www.simonet.org.uk), and for FESI see [www.fesi.org.uk](http://www.fesi.org.uk).)



Animated discussion at the Royal Academy of Engineering during a break

Professor Sharp commented that it was notable how many different industry sectors, and how many techniques – some 20 in all – were mentioned during the day's presentations and in the following Q&A sessions. He went on to say that there is a clear need to develop techniques appropriate for use with new materials such as FRP, and that existing data needs to be turned into useful information. He asked if the audience to consider whether or not every new structure should be monitored, and also if implementation should be reactive or proactive. Answers from the floor indicated that it should be both.

Brian Bell, Network Rail, stated that it is a case of 'horses for courses', and that it is essential to have good knowledge of the structures that will be monitored; therefore, to be proactive is difficult unless globally applicable systems can be devised but that all new large structures will be monitored. However, the investment involved must be risk-appropriate.

Professor Flewitt commented that monitoring serves two purposes and therefore two approaches are required in order to:

- monitor for the expected,
- monitor for the unexpected.

Professor Sharp observed that monitoring is all time-dependent and it may be that a period of ten years passes without anything of concern being flagged up.

In the ensuing discussion it was noted that the fact that nothing happened for ten years is also important information, and John Sharp said that this meant that the monitoring system had to be totally reliable so it could be depended upon to perform even at lengthy intervals.

Richard Lee, ESR Technology, commented that different sectors have different levels of maturity in respect of monitoring, and John Sharp noted that uncertainties which are linked to cost always exist.

Mark Stone, Sonomatic, raised the fact that where monitoring data is used there is a better appreciation of the limitations of the structure in question.

The question of a common language was introduced, and Dr Keith Newton, Director, RCNDE, asked if enough was being done to get the various constituencies from all sides of monitoring to talk to each other? It was noted that many clients do not have any idea of what is involved in the process and the level of work entailed. Professor Flewitt noted that people come from very different methodologies and approaches, use different codes, and are addressing diverse structures – this is where steps need to be taken to understand the context.



Dr Keith Newton, Director, RCNDE, discusses the NDE role in research

Professor Feargal Brennan, Cranfield University, noted that at one time Human Factors work was done – the inspection resource is limited, and therefore there is a need to spend wisely and rank criticality. This then raised the question of the interface between inspection and the monitoring system.

Dr Iain Le May, MCS Ltd, observed that it is necessary to know the history and context of the structure; for instance, where concrete degradation had occurred. Professor Sharp commented that where RBI is used there is a better idea of the issues involved in, for instance, oil, off-shore, power, and so on.

Brian Bell noted that there is also a need to convince regulators that what the industry is doing is safe – Network Rail can't alter the risk to the travelling public and there is always the question of how to deal with an unforeseen crisis. John Sharp noted that there is a lot of conservatism in this area, and Brian Bell stated that the sheer number of people impacted makes it difficult.

Dr Brett McKinley, City University London, said there is a need to construct an overview of the various approaches, sectors and standards, in order to clarify cross-industry approaches, and the same applies to RBI approaches. John Sharp noted there was a role here for FESI and SIMoNET, and stated that while some areas are well developed, whereas in others a lack of codes holds people back.



Philip May, Atkins, discusses structural integrity monitoring in the context of offshore oil & gas production facilities

Dr Norman Swindells, Ferroday Ltd, offered that there is in fact a new standard – ISO 10303 235 – for data conservation and digitisation. He noted that it is essential to separate the computerisation from the software in order to be able to use the data in the future, when the software is obsolete. *(Editor's note: An introduction to ISO 10303 235 appears in the FESI Bulletin, Issue 5, Vol. 1, Spring 2011: [www.fesi.org.uk](http://www.fesi.org.uk)).*

John Sharp said that, thinking ten years ahead, there is a need for a road map and an indication of how change would be managed, as well as an identification of all the gaps in knowledge and resources.

Richard Lee, ESR Technology, endorsed this idea, and Professor Flewitt raised the question of an appropriate custodian. John Sharp suggested FESI, Brian Bell suggested a KTN (Knowledge Transfer Network), and Dr Elena Barton (NPL) suggested NPL.

Philip May, Atkins, pointed out that monitoring is in fact a proactive approach because it is part of a bigger picture – that is, of avoiding failure. Alan Hodder, National Grid, stated that it is difficult to get the sensitivity right and also the alignment between the opposite ends of the process: namely, the client and the monitoring organisations. With some clients the level of skill is very variable, and there is a need for information about the costs of but also cost-savings because of monitoring interventions. John Sharp asked about the availability of cost-benefit analyses. Alan Hodder said there is a question of how the benefits might be demonstrated to the client, and how it might be possible to convince the budget-owner to spend on monitoring; it can be the case that an unintended consequence inhibits progress in bringing clients and interventions together.

It now being 16.45 John Sharp drew the discussion and the day to a close, thanking Poul Gosney, CEO, FESI, for his thoughtfulness in arranging for the provision of bacon butties to sustain all delegates during the morning session.