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## **Forensic engineering: a suitable case for investigation?**

### Objective of the hands-on session

To present case studies of engineering failure, then to investigate their merits and identify their limits as subjects for problem-based learning exercises. The overall aim is to look at how to take interesting material and turn it into suitable active learning. This will be a facilitated activity that will allow participants to establish the key concepts, advantages and drawbacks in problem-based learning as well as share their own experience.

### Outline of the activity

Forensic engineering is loosely defined as legal investigations undertaken by engineers covering failures in products, processes and designs. As such it contains many attractions to engineering students (not to mention staff). It is engineering problem solving in the public domain. In its most dramatic form it has the public enquiry or courtroom as the stage and with the contributions from politicians, lawyers, judges and journalists, it has the capacity to intrigue well beyond professional engineering boundaries. However, they are highly professional processes with a wide application of engineering skills and analysis. Since many details of major incidents are in the public domain, they are a rich source of material for case studies. Such a headline case will be presented in the form of a problem to be investigated.

Less dramatically, a simple component failure from a domestic context can provide an equally lucrative case study. With care, the raw data can be constructed into a problem for students to solve in the available time. Such a case will be presented to be discussed during the activity

Both examples have the attraction of being self-contained and having the possibility of different levels of complexity. Unlike design problems, the problem-solving is essentially convergent. While students will need to pool their personal knowledge, they will also need to pursue lines of enquiry that can be justified to the other members of the team. Teamwork and communication are essential to the success of these exercises.

This activity will consider examples of both types of problem-solving exercise.

To facilitate the evaluation of these examples, the activity will begin with a short introduction to problem-based learning as well as some input about forensic engineering.

The participants of the activity will then be split into groups of 6 and one half of the groups will consider the public enquiry example and the other the domestic component failure.

The activity will be facilitated by the author of the case studies. The groups' role will be to evaluate the structure and materials used in each of the examples using

the background theories of problem-based learning. The overall aim will be to answer the questions

- are these valid examples for problem-based learning?
- could these examples provide a template for other case studies?

The examples are based on the Open University's long experience of using case studies, of assessing projects and of the running of residential schools.

Targeted issues for the discussion

Problem-based learning, use of forensic engineering examples, the assessment of teamwork and of the use of expert input

Structure of activity

Introduction, setting of problem, group work, presentation of results, plenary

Schedule for the hands-on session:

Length of the activity: 1 hour

Length of reflection: 30 minutes

Length of discussion: 30 minutes

Materials needed

Computer projector, tables for groups of 6

Flip charts, post-it notes, access to photocopier