

Review



Alastair Soane finds this to be a useful procedural manual that may encourage more engineers to participate in forensic engineering and failure investigations.

Guidelines for failure investigation (2nd ed.)

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This is a manual of procedures to be followed when undertaking the forensic investigation of a structure of any kind. The text is slanted towards US practice, but the principles are universal and, with appropriate consideration of local requirements, can be adopted to apply anywhere. US forensic engineers are often involved in court proceedings so there is considerable emphasis on the legal processes there, and the way in which the expert will be expected to act.

The book is written by experienced and expert engineers who have been engaged in the investigation of failures and the untangling of what went wrong. Failures occur all too often so there is a corresponding need for logical, well-organised and thorough investigations. Forensic engineering is defined in the text as:

'The application of engineering principles to the investigation of failures or other performance problems. Forensic engineering also involves testimony on the findings of these investigations before a court of law or other judicial forum, when required.'

Because of the sensitivity around failure situations, the forensic investigator must take care to protect themselves from instances of non-payment by having a sound contract, and from accusations of improper or negligent conduct by acting with exemplary competence.

Not all failures are catastrophic collapses; they include facilities or parts of facilities that

do not perform as intended. More simply: 'failure is an unaccepted difference between expected and observed performance'. The rigour with which investigations are carried out, and the absolute need for ethical behaviour, are emphasised, together with the usual precautionary note that engineers should only do what they know they can do.

There are numerous checklists which form a useful introduction for newcomers to the sector and a valuable set of reminders for experienced practitioners. The art of forensic investigation will not appeal to those who have no appetite for formal detailed procedures. The lists cover data collection and the way in which data must be meticulously recorded and stored as it may be used as evidence.

The authors, quite correctly, emphasise that part of many investigations will be the need to take samples and carry out tests, either in a laboratory or *in situ*. The next step is to analyse the results and interpret the findings to culminate in a stage where there may be several hypotheses from which opinions and conclusions can be drawn. The investigator must remain open minded to all possibilities and thoroughly challenge their own opinions to reduce or eliminate prejudices.

Technology is changing rapidly and techniques such as laser scanning, remote sensing, the use of drones for photography, computer modelling for analysis, and recognising the benefits of the latest computer storage and retrieval systems are

suggested as being important for many investigations.

When it comes to writing a report, easily understood language is essential so that the document can be comprehended by a non-technical client, lawyers, and possibly by a judge with or without a jury. The report's purpose is to document the scope and findings of the investigation, communicate opinions and recommendations, and provide a basis for testimony in dispute resolution proceedings. It is a document that will be scrutinised in depth, as reputations, careers and large costs may depend on the outcome.

The layout and organisation of a forensic engineering report, along with chapter and section headings, are given in detail. This is particularly interesting for those who may have to give expert evidence. Conclusions are separated between opinions and recommendations, noting that these have different objectives. An appendix presents the ASCE Code of Ethics, which is similar to the IStructE Code of Conduct, and both underpin the basis of any forensic engineering report.

There is comprehensive guidance on how to perform professionally and how to act so that the client is supported in their quest for answers, the courts are given help in arriving at decisions where necessary, and the investigator is suitably protected. Some of the mystery surrounding the art of forensic engineering is dispelled and more engineers may be encouraged to participate in this important work. It is only by learning from failure events that we can improve safety, reliability and quality.



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