# Back to the Cause

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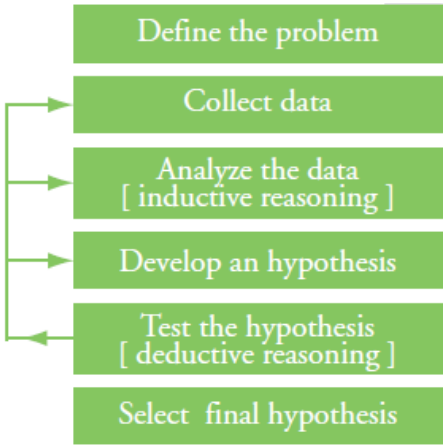
*An engineering assessment is the application of engineering knowledge and principles to an issue, typically to determine an appropriate engineering solution to a defined problem. Engineering assessments include structural, product, and system designs, all of which have been developed to solve a stated problem. Engineering knowledge may also be applied to a broader issue to develop a recommended course of action toward a desired outcome. Engineering assessments provide future solutions to existing problems.*

A forensic engineering assessment is similar to an engineering assessment; however, it is prepared after a failure has occurred, with the knowledge that it may be used to assist in the resolution of a legal issue, dispute or claim, and therefore may be scrutinized by a worthy adversary. In this way, forensic engineering assessments might be better described as forensic "failure" assessments in which engineers assess the cause of a failure. The goal of a forensic engineering assessment is to develop the best understanding of the available information, so that the cause of failure and the relevance of possible contributing factors can be considered.

As part of this process, the scientific method should be adopted to ensure credibility in forensic engineering assessments and the resulting conclusions. The scientific method is a recognized procedure applied to the collection, analysis and assessment of information. Application of this process develops understanding of the relevance and significance of any information, and the contributing factors to the occurrence. The process requires an understanding of the scientific method to collect, analyze, and assess the significance of the information with respect to a client's position in the scenario.




A good example and reference for the scientific method and its use to support an engineering assessment can be found in NFPA 921, *Guide for Fire and Explosion Investigations.* NFPA 921 defines the scientific method as the *"systematic pursuit of knowledge involving the recognition and formulation of a problem, the collection of data through observation and experiment, and the formulation and testing of a hypothesis."* This guide is a standard that was developed by the Technical Committee on Fire Investigations to "*assist in improving the fire investigation process and the quality of information on fires resulting from the investigative process*".

Prior to the widespread adoption and implementation of NFPA 921, fire investigation was often an informal process that relied upon the experience of a senior investigator. A seasoned fire investigator would typically arrive on site, cup of coffee in hand, and determine the cause of the fire. While this type of investigation was based on the accumulated body of knowledge presented by the investigator, it was done in an undefined, undocumented, and unsystematic manner. This method worked as long as everyone agreed with the conclusion. However, the results of an investigation carried out under this approach could not withstand scrutiny, and the need for a defined method was identified. In time, a recognized procedure based on the scientific method was developed and is followed today.

Proper assessment should follow the scientific method as a recognized scientific method as a recognized procedure to structure engineering analysis of all forensic matters. The structured procedure helps to define the scope, focus the research, defend the work, and to support conclusions.

The scientific method should be applied to all investigations, including forensic engineering assessments from broken jars to damage assessments, to the cause and liability for slip and fall accidents and structural failures. Using the scientific method for each forensic engineering assessment helps the engineer work their way back to the cause of the failure for each assessment. This formalized approach enables one to develop and

systematically test their understanding of the failure to be sure that it complies with sound engineering and scientific principles. The scientific method is also utilized in court, when necessary to support conclusions, the chain of events that led to conclusions, and to understand the significance of each of the contributing factors. Furthermore, the scientific method is used to develop a clear and supportable understanding of the occurrence, such that any knowledgeable person (with engineering and scientific knowledge) would interpret the evidence in the same manner and arrive at the same conclusion. Application of the process requires experience, but is not completely reliant upon it. In fact, it reduces the reliance on "opinion evidence" in court, by providing documented support for the interpretations used in the assessment. The interpretations are based on recognized knowledge, testing, codes, standards and industry best practice knowledge.

One can never assume where the final assessment will end up without doing the work. Once complete, the failure mechanism arrived upon should be fully scrutinized with the client. This is done in order to assess the strengths and weaknesses of the conclusions drawn from the assessment. This step is always critical before proceeding to court.

Following this procedure also makes it easier to identify what information or interpretations would have to change in order to alter the outcome. The real benefit of the scientific method is that it can be used to illustrate and support the procedure followed by the consultant in support of the conclusions and recommendations made.

In conclusion, we have found the scientific method to be an invaluable tool in our investigative procedure. As such, we approach every forensic engineering assessment with the scientific method in mind. This procedure helps us to focus our approach in determining failure causes, streamlining our assessment process. The end result is a forensic engineering assessment that is fully supported with tangible evidence and observations. □