John Fildes, Ph.D. - Technical
Consulting Powered by Science and Analytics
(630) 248-0836
www.jfildes.com
fildes.j.m@gmail.com

Selecting the Right Expert

ACTIONABLE INSIGHT FOR LITIGATORS, INSURERS, AND CORPORATE COUNSEL

- Selecting the right science/engineering expert is a key decision that litigators and their clients make.
- The right expert brings the expertise and experience to accurately determine the underlying cause and origin of product failures and accidents and the ability to provide compelling testimony at deposition and trial.
- Selecting the right expert requires identifying the scientific/engineering disciplines that are needed but litigators may not have the scientific/engineering training to do this.
- The initial information in a product failure or accident can be misleading as to the underlying cause and origin.
- An overly simplistic expert selection approach can result in selecting an expert with excellent credentials but too narrow of an investigation approach.
- Products fail and accidents happen because underlying scientific principles are violated, not because codes or standards are not met.
- Compelling investigations require identification of the underlying scientific principles.
- A better approach for selecting experts and an investigation methodology is described that is based on the use of analytics to fuse discovery data with fundamental scientific principles.

This content is based on Dr. Fildes' scientific experience, He is not an engineering or lawyer and does not practice engineering or the law.

INTRODUCTION

Attorneys who litigate cases involving science and engineering face the challenge of having to select the right expert. The realities of a case are not under anyone's control, but the effective discovery of those realities and the framing of their meaning and implications are the foundation of achieving a superior outcome and minimizing costs.

Authoritative investigation results and analyses provide attorneys and their clients with reliable insight and the best basis to manage their risks through settlement, or the successful prosecution of their case.

Based on my experience conducting $28 million of R&D projects and numerous litigation scientific investigations in straightforward workplace accidents through complex cases with tens of million of dollars of loss potential, and my experience having led a $20 million scientific/engineering firm and have started/led a $6 million scientific/engineering firm, this Quick Read Article describes how to select the right scientific/engineering expert regardless of the complexity and multidisciplinary nature of the problem.

Selecting the right expert requires identifying the scientific/engineering disciplines that are needed but most litigators have little scientific/

engineering training. The initial information about a situation can also be misleading as to the underlying cause and origin. This makes it natural to select experts with a simplistic approach, but I have seen many situations where highly credentialed experts conduct too narrow of an investigation to determine the underlying cause and origin of complex multidisciplinary failures and accidents, and this produces misleading results and thus a poor outcome for their client.

A few examples follow. An industrial accident resulted from corrosion of a piece of equipment. Several parties hired metallurgists or mechanical engineers, but the underlying cause was really a failure of a water treatment process. Another industrial failure resulted from corrosion of heating equipment and the parties hired metallurgists who did not identify the real underlying cause that the chemical process in which the heater was used was operated out of specifications and the heating equipment was not capable of handling the conditions.Another dispute involved a solid residual from a water treatment process. The plaintiff hired an environmental engineer, but the underlying cause of the dispute was due to the chemical properties of the residual. Resurfacing of tens of miles of roadway failed soon after the resurfacing. The municipality used a mechanical engineer who was a senior professor of a major research university, but the underlying cause of the failure was a chemical adhesion issues rather than the mechanical failure postulated by the engineer. The failure of a laminated window appeared to be due to a building envelop issue that allowed water intrusion, but a broader investigation revealed it also to be due to a poor choice of adhesive for the laminate.

Engineering or Science?

The National Academy of Engineering (NAE) noted in its Amicus Curiae brief to the U.S. Supreme Court in the Kumho Tire Case that science focuses on understanding nature and engineering focuses on modifying nature and that "…science provides the foundation for the engineer's work." The U.S. Supreme Court did not make a distinction between science and engineering in developing the standards for technical investigations.

Justice Breyer in his Introduction to the Reference Manual on Scientific Evidence, 3rd. Edition, National Academies Press, writes "All of the justices of the Supreme Court, in an opinion by Justice Breyer, held that the trial court's gatekeeping obligation extends to all expert testimony,37 and unanimously rejected the Eleventh Circuit's dichotomy between the expert who "relies on the application of scientific principles" and the expert who relies on "skill- or experience-based observation. 38."

Litigators often seek engineers as expert witnesses, but this can produce too narrow of an investigation. Although engineering modifies nature through the application of scientific principles guided by codes, standards, and design procedures, accidents and failures happen because scientific principles are violated. All the cases I previously described and others for which I have written white papers (that can be found at www.jfildes.com) involve codes and standards, but the cause of the failure or accident in each was a violation of fundamental chemical principles.

Thus, an investigation needs to go beyond codes, standards, and design guidelines and explore the underlying scientific principles.

An Effective Approach to Science/ Engineering Investigations

A common approach to conducting scientific/ engineering investigation is to conduce an inspection followed by testing. I use a broader

approach that has meaningful value for investigating complex multidisciplinary issues.

My broader approach still uses inspections, discovery results, and testing, but my approach is infused from the outset with using modern analytics to fuse the data from inspection and testing with fundamental principles from physical chemistry and relevant available scientific studies.

Physical chemistry is the application of physics principles and mathematical methods to chemical systems that span all other sub-specialties of chemistry. Physical chemistry is an important and unique science because it provides the scientific basis for a vast variety of engineering disciplines such as: heat and moisture transfer that underlie chemical process engineering and building envelope science; the strength of materials such as composites used in aircraft; ceramics; chemical reactivity that underlies chemical process control; and electrochemistry that underlies corrosion.

Analytics, which involves data mining and modeling, is likely not thought of as part of a litigation-related investigation, but it should be as indicated by Virginia Tech's College of Science having made analytics an overarching theme of its graduate degree programs. A message from the Dean of Virginia Tech's College of Science stated "At the Virginia Tech College of Science, we have reimagined scientific research…. We are focused not on data itself, but amplifying the relevance of that data with analysis, modeling, and interpretation." (Va. Tech Science, Fall 2019).

How Analytics and Physical Chemistry Benefit Scientific Investigations

I have used analytics to fuse discovery data with physical chemistry scientific principles and data from relevant literature-reported studies, especially ones from industry which publishes highly valuable data that is extremely relevant to product failures and accidents. I have routinely done this in numerous cases that span relatively straightforward industrial accidents through incidents involving highly complex multidisciplinary issues with tens of million dollars of loss potential.

The outcome of my investigations has helped to resolve everyone of these cases, often changing the nature and trajectory of the case, and often being resolved on the basis of my report without the need for a deposition. This is because the approach I use typically allows me to support each conclusion by two or more semi-independent analyses, and also allows very straightforward reports with well supported specific conclusions (opinions), which provides compelling insight. See www,jfildes.com for these case studies.

It is common to have significant gaps in the available data in investigations of product failures and accidents because product failures and accidents do not happen in the controlled environment of a lab and usually lack adequate sensors and monitoring technology. My analytics-based approach fills in these significant data gaps. Using analytics to merge the available data with predictions from the relevant fundamental scientific principles and relevant published scientific studies, especially those that come from industrial R&D, can fill these data gaps to a large and reliable degree that inherently validates the modeling that is used.

This analytics-based approach also predicts the expected outcome of testing which helps to define the testing that is needed, validate test results, and provide context for understanding the significance of the test results.

A very important outcome of this analytics-based approach is that it authoritatively establishes the bounds of what could have happened and what could not have happened. This is provides an

objective assessment of fact witness testimony and it significantly limits the use of unfounded, unsupported, and excessively creative opinions by opposing experts.

Another very important outcome of this analytics-based approach is that it inherently follows the scientific method and thus conforms to the most commonly used standard for admission of scientific expert witness opinions and testimony. In the Supreme Court Daubert decision, Justice Blackmun emphasized that science is a process in which an inference or assertion must be derived by the scientific method, which he described as a validation technique. Analytics is inherently a validation technique that fully embodies the scientific method.

I have used this scientific investigation approach infused with analytics and physical chemistry to produce an outstanding outcome in numerous cases. These projects spanned fairly straightforward workplace accidents through major equipment and industrial process failures with complex multidisciplinary issues, high visibility, and tens of millions of dollars of loss potential.

This approach produced insight that went well beyond that produced by other experts involved in the cases and changed the outcome of several cases. My methods and opinions were so well well supported that many of the cases were resolved on the basis of my report without the need for a deposition. When deposed, my depositions were straightforward because my reports provided specific, straightforward data-driven opinions. At trial, my testimony was credible and compelling because I was able to come to each opinion through two or more semi-independent means.

Bio for John Fildes, Ph.D.

Dr. Fildes is a doctoral scientist who has conceived, organized, and conducted $28 million of projects including R&D, litigation expert investigations, and collaborations involving Government labs, large defense companies, and leading universities.

Dr. Fildes was also CEO of an $18 million professional scientific/engineering consulting firm; president of a not-for-profit R&D institute; founder and leader of a $6 million scientific/engineering consulting firm; leader of a $3.5 million startup product design firm; leader of a $10 million contract research lab at Northwestern University; a senior professional in the $4.5 billion Borg-Warner Corporation Research Center.

Product Failures Expertise

Friction; Abrasive Wear, Adhesive Wear, Testing, Friction Measurement, Wear Prevention, Lubricants, Oil Quality Monitoring, Solid Lubricants, Hard Protective Coatings, Decorative Coatings, Paint, Electroplated Coatings, Corrosion, Electrochemical Corrosion Measurement, Ice Prevention; Gas Sensors, Carbon Monoxide Detectors; Product Design Procedures.

Materials & Process Expertise

Composites for Aviation, Buildings and Civil Construction: Thermoset and Thermoplastic Resins and Adhesives, Resin Transfer Molding, Autoclaving, Impedance Spectroscopy; Use of Composite Materials and Spray Foams Made On-Site In Construction; Roadway Chip Sealing, Water Treatment; Intelligent Process Control.

Chemistry & Chem Processes Expertise

Prediction Of Materials Properties, Stability, And Compatibility; Chemical Exposure; Chemical Process Equipment Failures.