

A MODERN SHERLOCK HOLMES APPROACH TO PRODUCT-FAILURE ANALYSIS

Product liability has gained increasing prominence in our society. Two converging trends are responsible for this greater importance. First, we have become a more litigious society. And, second, the products and services that dominate so much of our lives in business, industry, and the home are more numerous and more complex.

Industry Week magazine highlighted these realities in an August '90 cover feature that noted, "Product liability has made its way onto the public policy-making agenda consistently for 10 years." Where property is damaged, lost, or, even more injurious, when personal harm or loss of life has occurred, there is legitimate need to determine where fault lies. Was the product designed poorly? Did a manufacturing defect occur? Was the product incorrectly installed or maintained?

Often answers to such questions are neither easy nor straight-forward. Even so routine and commonplace an application as a computer power failure may entail lengthy and detailed analysis. Reconstructing the product failure to determine "what happened" may require Sherlock Holmes instincts. Typically complex variables that contribute to the outcome are uncovered through painstaking investigation and reverse engineering.

PGM Diversified Industries (PGMDI), a forensic engineering firm based in Cleveland, has accumulated an impressive history of successes in solving product-failure cases for the legal community. PGMDI performs these technical investigations for clients who may represent either side of a liability issue, defendant or plaintiff. Its findings and conclusions appear in documents and/or expert testimony that must be readily understood by nontechnical audiences, including lawyers, judges, and juries.

Mark Podany, PGMDI's president, reports that his firm is called upon to perform programs requiring a wide range of technical skills. "We get involved in situations from hands-on analysis to depositions and court appearances. We are equipped to provide the legal and insurance communities with highly specialized or full-service capabilities."

PGMDI's legal activities began soon after the firm's formation in 1985, but its related individual experience traces back much further. Frank Merat, one of the founders, who has been involved with over 40 cases since 1978, states that 75% resulted in successful outcomes either in pretrial proceedings or court settlements.

The evolving field of forensic engineering deals with legal questions calling for sophisticated technical investigations. Analysts must be proficient in many subjects including various technical disciplines, safety codes, and industry practices. Most

consulting specialists concentrate on narrowly defined areas, such as structural fires. However PGMDI's in-depth familiarity with physics, electro-mechanical disciplines, electronics, and other technologies enable it to address complex, multidisciplinary tasks.

THE ENGINEERING INPUT IN PRODUCT LIABILITY

When products fail the analysis is often painstaking, lengthy, and detailed. But lay audiences require explanations that they can understand and act upon. Therefore, explains Podany, "The dual skills of problem solution and clear communications are not only desirable but necessary." An analysis must ultimately result in a definitive finding and conclusion that clearly describes what happened and why.

To perform this complex work, communicating to the lawyers, and often to a judge or jury, is a critical link in the process. For instance, in investigating the electrical switch operation of a coffee maker involved in a fire, PGMDI provided Peter Blake of the Detroit law firm of Blake, Kirchner, Symonds, McFarlane, Larson & Smith with a comprehensive technical and statistical analysis. Blake notes, "The dialogue with PGMDI's staff was continuous and intense, with no surprises. They were especially effective in helping me understand what they were doing on the technical side and the implications of their analysis."

PGMDI's high success rate is based on several strengths:

In-Depth Electrical Knowledge/Experience

Electrical technology is the critical input in the majority of product failure and related cases that PGMDI investigates. In the home and office, practically all product failures involve an electrical input. The electrical dimension is increasingly more significant as electronic equipment has become more pervasive in all segments of our society. Such equipment obtains energy from an electrical source, whether portable batteries or, in the vast majority of cases, "live" inputs, such as standard wall outlets in the home.

The trend toward using more electrical/electronic devices in our professional and personal lives has been ongoing for over 70 years, picking up the pace in the post-World War II period, and accelerating in more recent years. However this abundance has a down side. Sometimes devices malfunction and cause damage, even death, when the electrical power is not properly controlled.

PGMDI has accrued much experience in this niche area. It is particularly knowledgeable in working with domestic, commercial, and industrial electrical systems and appliances. For instance, electronic/electrical components that are integral to many such systems are often prime suspects in any failure analysis.

Wide Range of Technical Skills

Other technologies are always involved in some manner. The firm's founders are proficient in a wide range of technical disciplines that include physics, electromechanics, and electronics. They recruit staff support as needed to complement their expertise. More broadly, they are adept at interrelating how the differing technologies interact.

Often sophisticated test and measurement (T&M) equipment is used in the analysis process. Such usage requires the professional interpretation of data and subsequent integration of these inputs to the product failure in question. Increasingly such analysis draws upon powerful computer routines.

A knowledge of building and product codes is also critical. The engineers must be conversant with codes that embrace a wide range of installation, maintenance, and operating procedures. Since these codes vary greatly in differing geographic locales, the investigators seek out the applicable codes and then relate them to the analysis.

Most importantly, PGMDI engineers view the product failure investigation as a series of complex, frequently interrelated problems that require detailed analysis and nimble thinking.

This versatility was cited by John Peto of the Cleveland law firm of Reminger & Reminger Co. LPA. PGMDI was retained to analyze a death attributed to electrocution that was incurred at a bus shelter in downtown Cleveland. According to Peto, “The technical analysis was quite complicated. PGMDI engineers had to understand many variables ranging from building code and electrical manual interpretations to examination and testing of fuses, grounding, and other electrical components. They did it all in a hands-on manner. We were impressed with their technical competence.”

Creative Reconstruction of Product Failure

Product-failure analysis demands skills beyond the systematic accumulation and review of technical detail. Podany explains that “Reconstruction typically involves a large dose of intuition, supposition, and creativity, combined with the ability to devise “what-if” alternatives.” Inevitably the firm must make many judgments drawing on a combination of capabilities.

Analysis is always after-the-fact, and, as when a death occurs, there may be no witnesses. In other instances, including fires, evidence may be damaged and even destroyed. Under such circumstances reconstruction is particularly difficult and investigators, like a modern-day Sherlock Holmes, must be ingenious in piecing together the failure sequence.

Definitive Conclusion

The product-failure process and analysis conclude with a clear-cut finding that addresses:

- what happened
- why it happened
- conclusions and recommendations (if appropriate).

PGMDI management believes that a complete analysis requires a well-reasoned conclusion. On any given project, PGMDI analysts will summarize the key findings, often resulting from a long, tortuous, and detailed process, in a manner that a nontechnical audience can fully understand.

The conclusions attempt to pinpoint the exact cause of failure, e.g., faulty part, improper installation, out-of-specification usage. Where judgments are called for, PGMDI will label

them accordingly and offer its best-reasoned opinions based on the particular analysis and its extensive experience. If appropriate, the findings will include recommendations for corrective action.

The conclusion will also identify those components which have worked well and should clearly not be potential contributors to the product failure. Such findings indicate that the analysis has been exhaustive and considered all possibilities.

Easy-to-Understand Presentation

Communicating the results of a product-failure analysis to persons with a wide range of backgrounds is especially compelling when the case goes to jury trial and jurors know little or nothing about the technical details involved.

PGMDI staff use the latest graphics equipment to translate findings into intelligible outputs that can be readily understood by lay audiences. Generally the same persons who have performed the analysis also shape the actual presentation utilizing graphics software. Through this seamless transition, substantive argument translates into highly readable and visual outputs.

PGM DIVERSIFIED INDUSTRIES, THE COMPANY

PGMDI was founded in 1985 to provide consulting services to the legal profession and assist industry in applying innovative ideas that emanate from the academic community. The legal work that PGMDI performs draws heavily from its engineering base with skills in physics, advanced automation, sensors, control systems, and electrical, electromechanical, and electronic technologies.

The firm's three founders all participate in the case work for the legal community. Their skills draw from differing yet overlapping technical disciplines. With strong ties in both the industrial and academic communities, the firm's engineers apply new ideas evolving in university laboratories to practical, real-world product-failure analyses.

For more information, contact Mark Podany, President, PGM Diversified Industries, 6514 Alexandria Drive, Parma Heights, Ohio, 44130-2850; telephone: (440) 885-3500; fax (440) 842-9228; e-mail: pgmdi@pgmdi.com.