

Forensic Engineering

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According to the National Society of Professional Engineers (NSPE)¹ and the National Academy of Forensic Engineers (NAFE),² “Forensic Engineering” is defined as the application of the art and science of engineering in matters which are in, or may possibly relate to, the jurisprudence system, inclusive of alternative dispute resolution.

Forensic engineering has also been defined as the investigation of materials, products, structures or components that fail or do not function as intended, causing personal injury or damage to property.³ Forensic investigation involves a careful inquiry and report of causes of distress and failure of engineered processes, materials, and transportation infrastructure components. The goal of forensic engineering is often to improve performance or life of a component.

The principles of forensic engineering can be used to investigate and understand failures in a wide variety of fields, including Transportation Infrastructure, Construction Engineering, Electrical Engineering, Product Liability, Premises Liability, Environmental Contamination, Pyrotechnics, Fire Suppression Systems, and Eminent Domain to name a few.

For example, most engineering disasters such as structural bridge failures and building collapses are subject to forensic investigation by engineers experienced in forensic methods of

¹The National Society of Professional Engineers (NSPE) is the national society of engineering professionals from all disciplines that promotes the ethical and competent practice of engineering, promotes licensure and enhances the image and well-being of its members. Founded in 1934, NSPE serves more than 54,000 members and the public through 53 state and territorial societies and more than 500 chapters. See also <http://www.nspe.org/index.html>.

² The National Academy of Forensic Engineers (NAFE) was founded to bring together those professional engineers who have attained substantial experience and recognition in forensic engineering practice. It seeks to improve the practice, elevate the standards, and advance the cause of forensic engineering. NAFE is a not-for-profit (501.c.6) membership organization requiring a professional engineer's license and extensive engineering experience including engineering experience in the courts, together with recommendations of attorneys as a prerequisite for NAFE membership. Membership in the Academy is limited to Registered Professional Engineers who are also members of the National Society of Professional Engineers (NSPE). They must also be members in an acceptable grade of a recognized major technical engineering society. See also See <http://www.nafe.org>.

³ http://en.wikipedia.org/wiki/Forensic_engineering

investigation. Likewise, forensic engineers often investigate rail crashes, aviation accidents and some automobile accidents, particularly where component failure is suspected.⁴

After an accident or operation failure, forensic engineers are called in to examine the broken parts, products, or structures and put together a list of probable failure mechanisms to be investigated. Drawings, specifications, and operational procedures are carefully reviewed and interviews are often conducted to determine the exact sequence of events. In turn, analytical and testing tools are then used to confirm the findings of fact.

In fact, forensic engineering is becoming such broad and developing field that on January 21, 2006, NSPE and NAFE developed a joint statement outlining basic standards for Professional Engineers engaging in Forensic Engineering. Specifically, the joint position of NSPE and NAFE states that:

1. Forensic Engineering "...is defined as; —the application of the art and science of engineering in matters which are in, or may possibly relate to, the jurisprudence system, inclusive of alternative dispute resolution." [National Academy of Forensic Engineers - NAFE: 1991]
2. The practice of licensed Professional Engineers as Forensic Engineers is important for the protection of the public health, safety and welfare.
3. Forensic Engineering derives from and may include knowledge and experience from any engineering discipline or specialization, but forensic engineering practitioners should limit their offering of services to the fields in which they have actual experience, or which may require only basic engineering knowledge.
4. Licensed Professional Engineers in their practice as Forensic Engineers should be guided by the same codes of professional conduct (such as the NSPE Code of Ethics) as are other engineers in their particular disciplines and specializations.
5. Forensic Engineers should endeavour to provide objective, non-biased reporting and testimony. Contingency fee compensation arrangements by Forensic Engineers are deemed to be unethical. [BER Case 03-13].
6. Professional Engineering licensing boards should not impose codes of conduct or standards of practice for Forensic Engineers which would be any different from those applicable to all other practice areas of Professional Engineering.
7. Professional Engineering licensing boards should accommodate expedited interstate mobility for Professional Engineers in their fact-finding role as Forensic Engineers to maximize the availability of competent Professional Engineers in forensic matters involving dispute or litigation. The courts are encouraged to utilize licensed Professional Engineers for engineering related testimony.
8. Licensed Professional Engineers in their practice as Forensic Engineers are sometimes required to gather data and document accident sites. This activity should not be construed to be work done solely by Private Investigators or licensed Private Detectives. The practice of engineering should allow Professional Engineers to gather facts necessary to reach an engineering opinion without a requirement for separate licensure as an investigator or detective.

⁴ Id.

9. Professional Engineering licensing boards are charged with protecting the public from unethical practice by licensed Professional Engineers, including those involved in the practice of Forensic Engineering. However, the boards are encouraged to be prudent in investigating Forensic Engineering practice complaints as adversarial attorneys may use the board's investigative powers to seek an advantage in their litigation strategies.⁵

Additionally, the extensive footprint of forensic engineering is also utilized by the Federal Highway Administration (FHWA) Office of Research, Development and Technology, which incorporates bridge and pavement forensic and specialized engineering services into the technical services they provide. These experts routinely provide technical assistance to state highway agencies, other FHWA offices and State engineers. In fact, the conduct of specialized forensic analyses is an essential Office of Infrastructure R&D mission.⁶

Examples of such services for bridge forensics include recent studies of constraint-induced brittle fracture, expert technical assistance on the wind engineering aspects of new long-span bridges including field testing to perform dynamic characterization of bridges during various phases of construction, model tests to solve unusually complex hydraulic problems (especially those involving scour), failure analysis of coating systems, and evaluations and inspections using specialized nondestructive evaluation methods.⁷ Similarly, for pavement forensics, examples include forensic evaluations of performance problems in pavements, and solutions and recommendations to address construction quality-assurance problems or to develop effective construction specifications.⁸

Undoubtedly, when the failure of a component of a product leads to personal injury, damage to property or large financial loss, it is the job of the forensic engineer to discover why the failure occurred, so that liability or fault can be clearly identified and future injury or loss can be prevented.

The future of forensic engineering is growing as forensic engineers are also expected to help sort out legal disputes concerning product defects and can be seen working as consultants, for corporations or independently. While forensic engineering is seen as a specialized discipline, it is becoming widely utilized across an ever increasing variety of fields in order to provide improved quality, efficiency, and performance of materials, products, structures or components as well as to protect the public health, safety and welfare.

⁵ http://www.nafe.org/index.php?option=com_content&view=article&id=48&catid=47

⁶ <http://www.tfhrc.gov/about/03085/07.htm>

⁷ Id.

⁸ Id.



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