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Forensic investigation is very much in the public eye nowadays, due in part to the popularity of such TV programs as *CSI: Crime Scene Investigation* and the proliferation of lawsuits brought by the public or insurance companies seeking to lay blame for motor vehicle accidents or property fires. Many professional engineers are active in this field, as are current and former police officers and fire marshals, and scientists and technologists specializing in certain aspects of forensics. Indeed, there have been a number of discipline hearings recently involving professional engineers who specialize in forensic investigations and regularly act for their clients as expert witnesses in court or tribunal hearings.

Some practitioners—both professional engineers and others—claim fire investigations and accident reconstruction are not engineering disciplines, while others claim only professional engineers are qualified to undertake such activities. So where does PEO stand on this issue? When does forensic investigation become forensic engineering?

Any discussion of this topic must start with the *Professional Engineers Act* and the definition of the practice of professional engineering contained in section 1 of the Act. The definition sets out a three-part test and the answer to each part must be “yes” before an action is considered to be the practice of professional engineering. To test an action against the definition, you must ask yourself whether the action:

1. involves any act of designing, composing, evaluating, advising, reporting, directing or supervising;
2. concerns the safeguarding of life, health, property or the public welfare; and
3. requires the application of engineering principles, but does not include practising as a “natural scientist.”

Forensic investigation: When is it engineering?

Forensic investigation crosses the line into engineering when it involves the application of engineering principles. It is not the type of investigation, but rather the nature of the investigation, and the information, tools and techniques that are used in it, that are the determining factors.

PEO’s position is that if the nature of the forensic investigation meets all of these tests, it falls within the practice of professional engineering. Furthermore, the provision of expert testimony based on such activity must also fall within the practice of professional engineering, and the expert providing this testimony should be licensed and hold a Certificate of Authorization.

The following two examples, based on real investigations, illustrate that there are roles for both professional engineers and others in forensic investigations.

Example 1

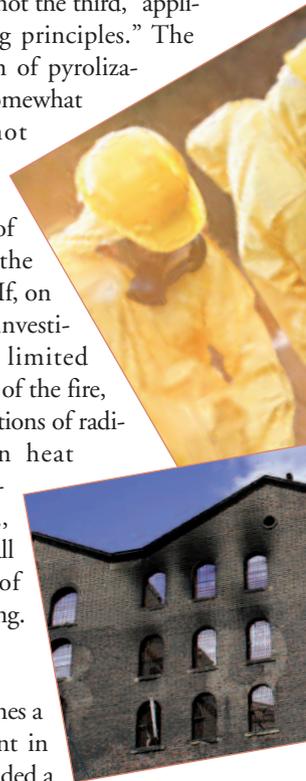
An investigator examines a fire scene in a residential home on behalf of an insurance company. The investigator conducts a thorough examination and observes smoke damage on the interior main floor, fire damage in the basement area and deep charring on the exposed floor joists adjacent to the hot air furnace. Measurements reveal the clearance between the top of the hot air plenum and the bottom of the heavily charred floor to be approximately three inches. The furnace manufacturer advises the installation specifications, certified by the Canadian Standards Association, called for at least six inches clearance to combustibles. The investigator concludes: “In my opinion, the furnace was installed without adher-

ence to the manufacturer’s specifications covering minimum clearance to combustibles. Over time, the unprotected wood joists were pyrolyzed and eventually ignited by radiant heat from the hot air plenum.”

In PEO’s view, this investigation does not fall within the practice of professional engineering—it meets the first two tests of the definition, but not the third, “application of engineering principles.” The suggested mechanism of pyrolyzation and ignition is somewhat speculative, but not unreasonable, and arguably less important than the cause of the fire, which was the inadequate clearance. If, on the other hand, the investigator rules out the limited clearance as the cause of the fire, on the basis of calculations of radiant and convection heat transfer, resultant surface temperatures, etc., that opinion would fall within the practice of professional engineering.

Example 2

An investigator examines a motor vehicle accident in which an SUV rear-ended a



small car at a stop light, resulting in a whiplash claim from the driver of the stationary car. The investigator examines photographs of the damage to the vehicles, obtains measurements of the resting positions of the vehicles, bumper heights, driver statements, etc. On the basis that both drivers confirmed their vehicles were initially at rest, and were separated by two to three metres, the investigator conducts acceleration tests of a similar vehicle. The investigator concludes the maximum speed of impact of the SUV into the back of a stationary car was 11 km/h. This report is based solely on observations and testing, and does not fall within the practice of professional engineering. However, if a professional engineer carries out calculations based on the power available at the wheels, the frictional forces on the tires, conservation of momentum and energy absorption in the collision to make reliable predictions of the resultant force on the driver of the stationary vehicle, these calculations involve the application of engineering principles, and the accident reconstruction would fall

within the practice of professional engineering.

So it is evident that crossing the line

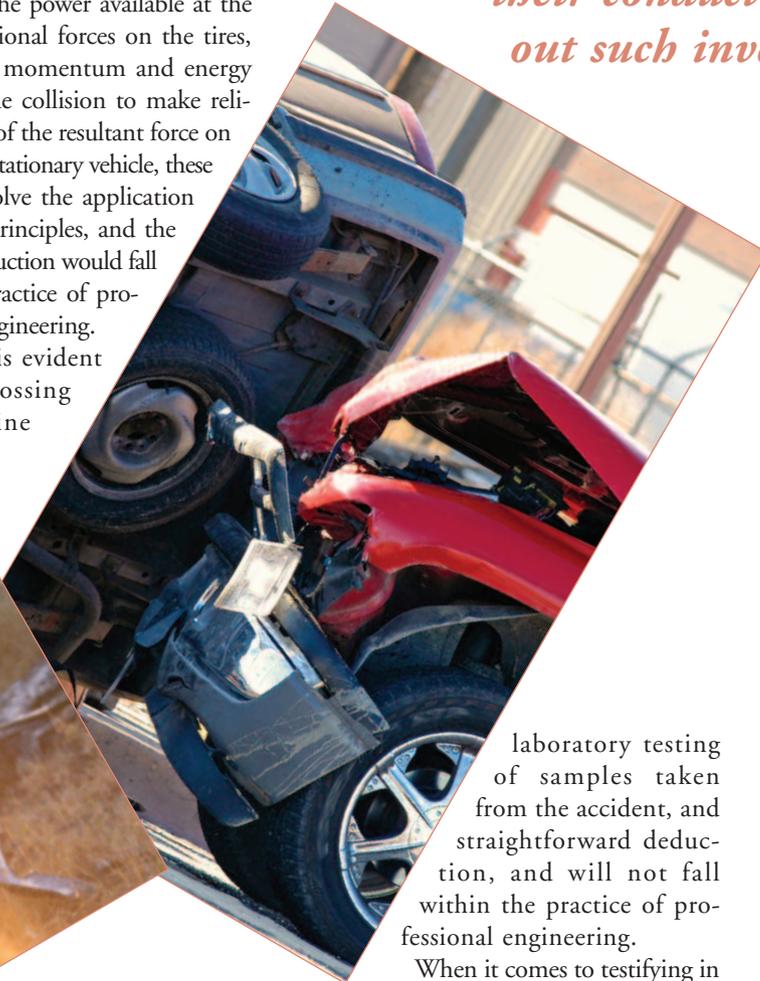


into forensic engineering is not a function of the type of investigation (e.g. origin and cause of a fire, motor vehicle accident reconstruction), but rather the nature of the investigation

and the information, tools and techniques that are used. In the absence of the application of engineering principles, forensic investigation work can rightly be carried out by non-engineers. Indeed, many forensic investigations will be primarily detailed inspections of the accident scene, review of all relevant documentation and standards,

February 1, 2006): "The theory of allowing experts to provide opinion evidence is to assist the trier of fact make an informed judgment by providing special knowledge the ordinary person would not have...Regardless of who pays him, the expert's primary duty is to the court and not to the client." Further guidance is available in the PEO guideline, *The Professional*

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laboratory testing of samples taken from the accident, and straightforward deduction, and will not fall within the practice of professional engineering.

When it comes to testifying in court, it is important to recognize that the professional engineer's duty to public welfare is paramount (Regulation 941 under the Act, s.77.2). Quoting Vern Krishna, QC, former treasurer of the Law Society of Upper Canada (*National Post*,

Engineer as an Expert Witness. Testimony on investigations involving the practice of professional engineering also falls within the practice; this view has been upheld by Justice Festeryga, who ruled a person was ineligible to testify in *Mann vs. City of Hamilton* (Superior Court of Justice File No. 4543/98) as he was not licensed as a P.Eng. in Ontario.

Lastly, it is important to note that professional engineers involved in forensic investigation are accountable to PEO for their conduct in carrying out such investigations. This is true regardless of whether the investigation requires the application of engineering principles. PEO would argue that such investigation work, while not being the practice of professional engineering, is certainly relevant to the practice of professional engineering. Under section 72(2)(j) of Regulation 941, any conduct or act that is relevant to the practice of professional engineering and that is performed in such a way that would be regarded as unprofessional, disgraceful or dishonourable, could be a basis for a finding of professional misconduct by the Discipline Committee. Similarly, non-engineers whose forensic investigations cross the line and include the application of engineering principles may be subject to enforcement action by PEO. ❖