



THE FORENSIC ENGINEERING REPORT

I-ENG-A® [IN-JUH]

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Fire Investigations “Experience or Science”

In the realm of fire investigations, there appears to be a general consensus among the investigative community at large that experience is to be relied upon more than a scientific approach to origin and cause. The more experience an investigator has under his/her belt, the thinking goes, the better able he/she is to complete the quintessential task; the origin and cause of the fire. Yet, with no standardized curriculum for the forensic fire investigator, why does experience so easily trump the scientific approach to investigations for many in the industry? In 1997, the International Association of Arson Investigators (IAAI) joined in the filing of an *amicus curiae* brief, in

Kumho v. Carmichael, arguing, in essence, not to apply *Daubert* to testimony based on an expert’s “experience”. The IAAI promulgated such a stance, ostensibly, in the fight against the crime of arson. The Supreme Court flatly rejected this argument, and reversed the ruling of the Eleventh Circuit court, citing the gate-keeping obligation of *Daubert* applies not only to “scientific” testimony, but to all “expert” testimony. The Supreme Court ultimately agreed with the original District Court’s conclusion that the witness could not reliably determine the cause of the failure of the fire in question based on his methodology of using, if you

(Continued on page 2)

Failed Generator: *Did the Rat Do It?*

A 3250KVA Beloit Power Systems Generator (3 Phase, 4160V, Serial # 504703R2) had a failure. The Unit had approximately 1400kW load when the failure occurred. The Unit was running with the voltage regulator in manual mode, as typical. The first indication of a problem was when employees “felt the ground shake”. The employees saw fire come from the opposite drive end (ODE) of the generator at the 7 o’clock position. The Locomotive was manually shutdown. Initial inspection of the motor revealed that several stator cables near the 7 o’clock position had failed. Additional inspection revealed extensive damage to several stator coils on the ODE near the 4 o’clock position near the slots. Several days after the failure, employees reported the remains of a rat across the fuses of the left most potential transformer



(PT) in the control cabinet for this generator.

Investigation Revealed:

When the PT in the control cabinet was inspected there were no indications of arcing. Next, the generator was partially disassembled for inspection. The opposite drive end (ODE) end bell was removed. The stator coil and lead damage were observed at the 4 and 5 o’clock positions. A visual inspection was conducted on the ODE bearing which was still assembled to the shaft and no damage was noted. An inspection of stator damage near 5 o’clock position found a phase to phase fault at a lead end coil. Also this generator was noted to have previous repairs made at the location of the failure. This type of failure is consistent with a voltage surge or high transient. However, failure at a previ-



FIRE INVESTIGATION: EXPERIENCE OR SCIENCE? CONTINUED

will, a process of elimination. Old habits die hard, and to this day, there are arson investigators who believe experience-based determinations are more accurate than those based on the scientific method. Some go so far as to suggest their work should not be assessed in the light of scientific review. Even NFPA 921, article 18.2.1 allows for the “credible determination regarding the cause” of a fire without physical evidence of the ignition source. This concept of determining the fire cause, in the absence of proof, has a long-standing history in the fire investigation community. Yet, this *negative corpus* methodology, in which an ignition source is determined without the physi-

cal evidence, is the kind of non-scientific approach that the Supreme court rejected in *Kumho v. Carmichael*. Experience vs. Science? Experience is needed...but science is the yardstick. Give your local I-ENG-A member a call. All are Professional Engineers following the scientific method for fire investigation and the current NFPA 921.

Locate your closest member by visiting: www.ienga.net or our Community website located at: www.ienga.com

Article by: I-ENG-A of Columbus Ohio, Steve Feeney, PE
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Generator Failure

Did the rat do it?...*Continued*

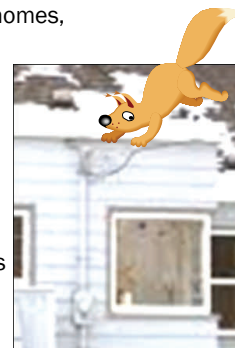
ous repair location calls into question the quality of the previous repairs. Also it is reasonable to expect that a properly insulated generator should “ride through” a blown PT fuse. There was no evidence of any overvoltage or over-excitation protection on this generator. The event would normally end with the operation of a protective relay without failure of the generator. The Industry standard IEEE STD 242-2001 Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems provides information on the application of devices to protect generators. Rat or no rat, a properly protected Generator should not have burned up.

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The Electric Squirrel

Almost all residential buildings, single family homes, and many small commercial buildings receive their electrical power from a transformer, which significantly lowers the voltage prior to entering the home or building. The power is supplied via over-head, or under-ground service—generally 240 volts. While 240 volts is say, a lot less than 139,000 volts, 240 volts is still enough to give you a good jolt. Now, you get a call from a policy holder claiming a squirrel crossed the overhead power lines, breaking a line that broke free and fell against their aluminum siding, resulting in the siding being covered in arcing marks.



Being a perceptive claims adjuster, you question whether the power company should have a safety device that would have prevented this problem. **YES!** But, we would want to see...that squirrel! If a squirrel, or any other animal for that matter, had caused some type of short circuit within or between conductors, leading to failure, the squirrel might well be dead on the ground. Regardless, such a scenario is highly unlikely, and even if the rodent did cause the short circuit, why didn't the over-current protection open up?

Give us a call to see if we can help you quickly resolve the issue.

Article by: Steve Feeney, PE, I-ENG-A of Columbus, OH
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Nationwide Toll Free: (800) 523-3680



Up on a Hot Plastic Roof

The increasing use of “plastic” roofing materials has grown in popularity in recent years, and the installation of this roofing material has found increasing use around the country. One popular type is referred to as TPO Roofing Membrane. TPO is an acronym for thermoplastic polyolefins.

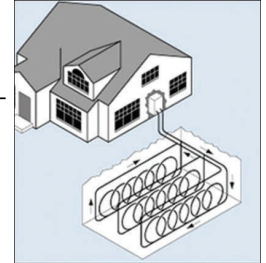


Based on the nationwide experience of the I-ENG-A network, problems with thermoplastic roofing membrane is not always poor or faulty installation. Depending on when the particular installation was completed, it may mimic some of the difficulties with the early installations of EDPM and PVC roofing membrane. Until the manufacturers and installers ironed out some of the early kinks in the system, problems experienced were generally a combination of manufacturing process defects and/or installation techniques that needed to be mastered. Keep in mind, there is a specification for these TPO roofing systems, and they are covered by ASTM specification D6878, Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing. This is a helpful step in “getting it right.” www.columbus.ienga.net

Who to Call?

Heat Pump Blues.

Your insured calls in to say that his heat pump has sprung a leak. The leak occurred at a point near the junction of the PVC pipe and a copper supply pipe. What’s the cause? Give I-ENG-A a call.



A Soil Remedy: Environmental Spills

Every time one of these tank trucks gets in an accident and spills its contents, you are spending the money to get the oil or other liquid contaminate disposed of in an environmentally acceptable manner. You hire a contractor to clean up the spill by soil remediation, but the bills seem to be excessive. Our recent experience has shown bills for soil remediation which should have been around \$15,000 were in excess of \$75,000.

Need an expert to check the bills? Give I-ENG-A a call at (800) 523-3680 for any location throughout the continental USA. We can route you to the closest office in our expansive network who can assist.



COMEDY RELIEF CORNER

A priest, a doctor and engineer were waiting one morning for a particularly slow group of golfers. The engineer fumed, "What's with these guys? They're taking forever!" The doctor chimed in, "I don't know, but I've never seen such ineptitude!" The priest said, "Hey, here comes the greens keeper. Let's have a word with him."

"Say, what's with that group ahead of us? They're rather slow, aren't they?" The greens keeper replied, "Oh, yes, that's a group of blind firefighters. They lost their sight saving our clubhouse from a fire last year." The group was silent for a moment. The priest said, "That's tragic. I will pray for them tonight." The doctor said, "Good idea. I'm going to contact my ophthalmologist buddy and see if there's anything he can do for them." The engineer said, "Why can't these guys play at night?"

About www.ienga.com

Our community website has given you the power to post your questions for the I-ENG-A network to review and provide you with the answers you seek.

Register at www.ienga.com to get access to qualification information about the member firms of the Investigative Engineers Association. Once you are logged-into the site as a registered user, you will have access to our discussion forums, as well as information such as:

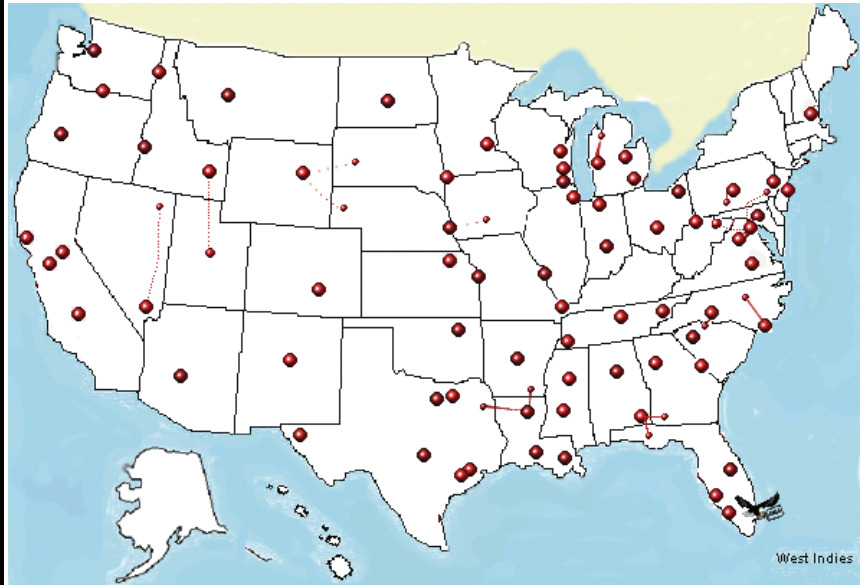
- Resumes
- Licensing
- Insurance
- Rates

We look forward to interesting discussions with questions and answers, to help adjusters and attorneys with their claims assignments. The forum can store this information which may serve as a valuable resource for all.

The commentary contained in The Forensic Engineering Report is not intended, nor should it be relied upon, to replace specific professional advice. We recommend that readers consult their professional advisors regarding issues raised in this publication.

I-ENG-A MEMBER FIRM LOCATIONS

Did you know that The Investigative Engineers Association (I-ENG-A) is the largest forensic engineering force in the United States! We have locations with teams of professional engineers and experts as indicated by the below map.



INVESTIGATIVE ENGINEERS ASSOCIATION (I-ENG-A)

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