

THE FORENSIC  
ENGINEERING REPORT

I-ENG-A® [IN-JUH]

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**SAMPLE "EVERY DAY" CASES INVESTIGATED  
BY THE I-ENG-A NETWORK**

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I-ENG-A

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Comedy Relief 3  
Corner...

The Investigative Engineers Association (I-ENG-A) member firms handle such a wide variety of assignments. It is sometimes difficult to portray the types of jobs we perform. When most people think of engineers, they think of a building collapse and a big bill. What many don't know is that we handle a large variety of smaller cases in a cost-effective nature. We have learned that insurance companies are looking for solutions that fit within their budgets and also help protect them from any kind of bad faith. We adhere to honesty in our investigations.

All I-ENG-A Member firms are licensed, insured, practicing Professional Engineering firms who have dedicated a division of their time and staff to forensic or investigative engineering. We participate in yearly conventions by the association and learn a great deal about how to provide the best investigative services. We also learn about the insurance industry and its needs.

Professional Engineers by their Code of Ethics hold paramount the safety health and welfare of the public in performance of all of their professional duties and are, therefore, keeping the best interest in mind for all parties involved.

Documentation and proper evidence handling and maintenance is key when dealing with today's litigious environment.

In this article, we present to you the brief summaries of a wide variety of case examples to demonstrate the expertise and diversity of our engineers. Generally, these examples are instances where our engineers have provided technical support to allow adjusters to handle the claim in an efficient manner. The cost of these example

services typically range from \$400 to \$1,600. While not all complex investigative assignments can be properly addressed in this fee range, the following cases will provide examples of how engineers can provide services very cost effectively:

**CASE #1  
HOT-TUB POP-OUT**



This residence had a hot-tub installed 8 years prior to the loss. The acrylic hot tub popped out of place six inches exposing the underside of the pipes with large voids under the concrete slab. The hot tub failure was alleged to have been caused from a water overflow condition from the adjacent pool and spa.

Determination: It was determined that the damage to the spa was in-fact due to long term erosion under the patio slab over the course of time due to improper compaction and a lack of anchoring.

Question: Who is really at fault? What are the installation standards in place, if any?


**EVERY DAY INVESTIGATIONS – I-ENG-A CASE STUDIES CONTINUED**
**CASE #2  
WATERLINE FAILURE**


The subject waterline was the suspected cause of a water loss. A laboratory analysis of the plastic tubing was performed. During the examination, one end of the plastic water line was found to have a jagged edge indicating a fracture or break had occurred. The visual examination determined that the break was from age and deterioration. Sunlight and small amounts of chlorine will make the water line stiff and brittle.

**CASE #3  
MOLD ORIGIN AND CAUSE**


This residence reportedly had mold growth in the bathroom located at the left corner of the building. The material in the area was considered plaster over wood lath. The wood showed evidence of being soft and damp and there was evidence of long-term deterioration of the wooden material. A cast pipe was located within this wall.

An examination was made in the basement and the pipe was part of the sewage system. This vent or discharge line led to the main sewer line and led to the exterior of the building.

A moisture meter noted evidence of dampness which, was from condensation or deterioration of the subject sewer line. The investigator felt the line with his hand and it showed evidence of being scaled and corroded.

A further examination was made of the exterior of the building at the roof level and it was noted that the pipe which vented through the roof had evidence of deterioration to the related material.

In conclusion, the subject water damage and growth within the wall itself was a direct result of long-term deterioration of the sewer vent/supply line. No single event or accidental event caused the damage.

**CASE #4  
AIR CONDITIONER  
LIGHTNING DAMAGE or NOT?**


This HVAC unit was retrieved from a junkyard for inspection for lightning damage. Upon inspection of the condensing unit, black burn marks were found on the contact points. Normal arcing inside the switch caused this type and amount of damage. As the switch aged the arcing gradually became worse.

An ohmmeter was placed on the capacitor and the reading was 26.7 microfarads. This reading is due to normal age. The capacitor was still in the working range. There were no shorts found on the condenser and it was in working order. The heater/blower unit checked out ok as did the fan blower motor.

The motherboard did have damage due to an electrical short which was the cause of the overall failure of the HVAC unit.

It was determined that the unit had not been struck by lightning and could have been repaired with a new motherboard. The cost of the board is around \$257.50 assuming 2 hours of service at \$60/hr + tax, the repair bill is estimated to have been \$402.51.

**CASE #5  
VEHICLE FIRE INVESTIGATION**


The subject vehicle was a 2000 Mercedes Benz S500 four-door sedan. Overall examinations revealed evidence of fire damage and scorching to the right front fender and partial consumption of the hood. The damage was primarily noted to the back portion of the hood or area near the windshield. The windshield sustained significant heat damage and had failed during the course of the fire.

All of the tires remained, however the right front did sustain some flame and heat damage. No evidence indicated a prior collision. No evidence of forced entry or impact damage. Ignition assembly remained intact. Examinations were performed of each compartment of the vehicle to eliminate potential causes of the fire.

The concluding opinions and fire patterns indicated that the fire originated in the engine compartment along the rear bulkhead wall area.

Two potential scenarios exist. The first is that the transmission fluid dipstick was not replaced during the recent service, in the retainer and allowed heated transmission fluid to back up through the tube and enter the engine compartment where it was able to ignite off a hot component of the engine.

The second was that the active body control distribution hose had deteriorated and hydraulic fluid discharged into the engine compartment and ignited. This failure is involved in a current recall campaign issued by the National Highway Traffic Safety Administration (NHTSA).

At this point a joint inspection was recommended so that all interested parties can jointly examine the vehicle (the service company and the manufacturer of the vehicle).



EVERY DAY INVESTIGATIONS—I-ENG-A CASE STUDIES CONTINUED

**CASE #6  
STONE MASONRY CHIMNEY  
MISSING STONES**



The subject home was constructed about Two Hundred (200) years ago. The present owners having purchased it about 22 years ago. Recently, it was noticed when looking from the road, that the stone masonry was completely removed and there were loose and missing stones along the bottom of the chimney.

The objective was to make recommendations as to the most probable cause. It was viewed that areas were cracked and missing mortar between boulders at isolated locations.

It was concluded that the subject damage is the result of age, wear and tear over the life of the chimney and stone masonry as evidenced by the deteriorating, loose and missing mortar around the areas where the stones had fallen away. The basis of this opinion is that there is no reason for the stones falling away and no visible ties between the stone and cement matrix and the actual chimney concrete.

Recommendations were made for proper repairs.

**CASE #7  
SCHOOL SPRINKLER HEAD FAILURE  
WATER DAMAGE CLAIM  
Previous Fire Damage**

The night prior to the fire, a low pressure alarm for the sprinkler system sounded. The fire department responded along with a building representative and they performed an inspection through the school and revealed no evidence of any water leakage, particularly from a sprinkler head.

The following day (Saturday), an employee of the school entered the building and noted that there was a low-alarm bell ringing on the exterior



of the building. Upon entering the structure, it was determined that a sprinkler head within this particular lab area was discharging water which resulted in the damages.

This circumstance is odd because normally when a sprinkler head allows for the discharge of water, a flow alarm activates a signal to notify a central station which ultimately notifies the fire department. This did not occur.

An examination of the subject art room, revealed two kilns within it which were below an exhaust hood and which were used the day before the loss date.

Two sprinklers were provided to the I-ENG-A Member laboratory. Reportedly, one of the sprinkler heads did not have a glass link within it and the other did. The sprinkler company made a decision to replace two heads within that room although one had not been damaged or activated. The failed head was secured. However the glass bulb was not found after the discharge occurred.

The preliminary conclusions after non-invasive laboratory inspection revealed that in all probability the sprinkler head had some form of deficiency, defect or sudden failure. The manufacturer and fire protection service are being put on notice for a joint examination. And, additional research is required to be certain that the waiting of the head was sufficient enough to be within the room that has two kilns.

A contributing factor to the water damage was the fact that a head was able to discharge water without an alarm being generated for the fire department's response.

**CASE #8  
WASHING MACHINE FAILURE?  
WATER DAMAGE CLAIM**



The purpose of the assignment was to examine the washing machine to determine if it was responsible for water damage in the structure.

The concluding opinions, based on analysis and evaluation of the washing machine, indicated that the tube between the wash tub and the pressure switch separated at the pressure switch control panel. This prevented the compression of air in the tubing to activate the pressure switch allowing water to continuously fill the tub and crest the top of the tub. The separation could have been prevented by adding a small clamp or fastener around the tube and pressure switch nipple. The responsibility should lie with the manufacturer of the washing machine.

COMEDY RELIEF CORNER

There are three engineers in a car; an electrical engineer, a chemical engineer and a Microsoft engineer. Suddenly the car just stops by the side of the road, and the three engineers look at each other wondering what could be wrong.

The electrical engineer suggests stripping down the electronics of the car and trying to trace where a fault might have occurred. The chemical engineer, not knowing

much about cars, suggests that maybe the fuel is becoming emulsified and getting blocked somewhere.

Then, the Microsoft engineer, not knowing much about anything, comes up with a suggestion, "Why don't we close all the windows, get out, get back in, open the windows again, and maybe it'll work!?"

Found in Net Dummy.



FORENSIC ENGINEERING SERVICE TO  
THE PROPERTY AND CASUALTY  
INDUSTRY SINCE 1991

INVESTIGATIVE ENGINEERS ASSOCIATION  
(I-ENG-A® [IN-JUH])  
FORENSIC ENGINEERING  
[WWW.IENGA.NET](http://WWW.IENGA.NET)

The **Investigative Engineers Association** is the nation's **largest** and oldest network of independently owned professional engineering firms committed to providing thorough, timely and cost-effective **forensic investigations** for the property & casualty insurance industry, legal community and other industries.

CURRENT MAP OF MEMBER FIRM LOCATIONS



3 Ways to Place an order for Claim Investigation

1. Visit [www.ienga.net](http://www.ienga.net) and click 'Request Claim Assistance'
2. Call (800) 523-3680 for the firm nearest you and/or for expert referral.
3. Go to [www.ienga.net](http://www.ienga.net) and click on locations. Click on the map to identify firm closest the claim location. Click on the firm name for contact information.

I-ENG-A® Association Headquarters

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.



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