221 Woodbine Avenue
Narberth, PA 19072
610-747-0675
Fax: 610-747-0677
E-mail: experts@plickandassociates.com
www.plickandassociates.com

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Plick and Associates, Forensic Engineers

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How Does Your Surge Protector Work?

Surge protectors, as the name implies, provide protection against voltage surges. Any electronic device containing a microprocessor, such as computers, televisions, audio and video equipment, is susceptible to damage from voltage surges. The most common type of surge protector contains metal oxide varistors (MOVs) between the hot (black) wire and ground wire. During normal operation, the MOVs do not conduct current. When a voltage surge occurs, MOVs allow the excess current to flow through them and into the ground wire. This maintains a normal current flow in the hot wire and to electronic equipment.

Voltage surges occur when high power devices in your house, such as compressors and motors, switch on and off. This switching changes the demand for power in the electrical system which disturbs the steady flow of electricity. Surges can also occur in the power delivered from your utility companies when switching equipment or when power lines are damaged.

MOVs can only absorb a certain amount of current before they will no longer conduct electricity. When this happens, the equipment powered by the surge protector is no longer protected. Further surges can cause damage to the electronic equipment and potentially cause the wires in the surge protector to heat up to the point of causing a fire.

There are also workmanship and manufacturing defects that can result in a surge protector causing a fire. Over the past ten years there have been recalls of thousands of surge protectors due to defects such as:

- Undersized wires
- Cracked, corroded and loose wires
- Loose connections
- Faulty soldering
- Improper grounding
- Non-polarized plugs
- Misaligned plugs

Do you have a device like this in your home or office protecting you valuable electronics?

The following are some points to consider when purchasing and using surge protectors:

- Look for a surge protector with an indicator light that lets you know if the unit is still protecting your equipment
- Be sure the surge protector is labeled as a 'transient voltage surge suppressor.' This means it meets the requirements of UL 1449
- Never exceed the rating of the surge protector
- Never plug one surge protector into another surge protector or an extension cord
- Only use surge protectors in dry locations
- Replace the surge protector if there is any evidence of overheating or if any of the outlets no longer work

Do you have a matter requiring forensic investigation or a question about your case which can be answered by a professional engineer, architect or industrial hygienist? Call us anytime at 610-747-0675 or email us at experts@plickandassociates.com

This Edition's Joke

A man was crossing the road one day when a frog called out to him and said, "If you kiss me and turn me back into a beautiful Princess, I'll stay with you and do anything you want." The man picked up the frog, smiled at it and put it into his pocket. Finally the frog asked, "What is it? I've told you I'm a beautiful princess, and I'll stay with you and do anything you want. Why won't you kiss me?" The man said, "Look, I'm an engineer. I don't have time for girlfriends, but a talking frog is really cool."

In This Edition

How to Find and Identify Hail Damage on Aluminum Siding, Part 2 of 2

In the first part of this article featured in the December 2005 newsletter, we discussed using different methods to identify hail damage on aluminum siding. In part two, we will take a look at the signs which indicate the siding damage was caused by other sources.

After hail storms, hail damage can be simulated by using a ballpeen hammer, screwdriver, or other implements.

Helpful signs this damage is not hail damage include:

- Dent marks evenly sized with spacing at very regular intervals. Hail creates dent marks with varying sizes at random intervals.
- Dent marks with scratches. Paint scratches indicate the damage was done by other hard objects, such as metal or rocks, striking the siding.
- Dent marks localized around the bottom and within other easily accessible wall surface areas. Hail hits entire wall surfaces, not just surfaces within a person's reach.

The US National Weather Service Hailstone Size Categories are:

- Pea = 1/4 inch diameter
- Marble/mothball = 1/2 inch diameter
- Dime/Penny = 3/4 inch diameter - hail penny size or larger is considered severe
- Nickel = 7/8 inch
- Quarter = 1 inch
- Ping-Pong Ball = 1 1/2 inch
- Golf Ball = 1 3/4 inches
- Tennis Ball = 2 1/2 inches
- Baseball = 2 3/4 inches

A Little Crack Can Mean Big Problems, Part 1 of 2

The sudden failure of a masonry block basement wall is dangerous and expensive. In addition to the immediate damage caused to the wall, additional damage can occur to the overlying structure. An ensuing risk of water and/or fire damage to the structure also exists.

Basement walls are subject to lateral pressure from the weight of soil piled against the exterior. Moisture in the soil increases the weight acting upon a wall. If the soil becomes saturated, the weight of water creates hydrostatic pressure, which also acts upon the wall.

Failures occur when the forces caused by the weight of soil and/or water exceed the ability of a wall to resist the force. Basement wall failures often occur following extended periods of rain, or sudden downpours, when the air spaces between the soil particles become filled with water. The strength of a wall is determined by its construction. Improper construction, coupled with saturation of the soil, is the most common cause of basement wall failures.

Generally, failures due to excess soil and/or hydrostatic forces cause lateral cracks along mortar joints in the masonry block, usually near the mid-point of a wall length, half-way up the wall. The center of a masonry block wall is often the weakest point. There are no perpendicular walls bracing the wall near the center, as there are at the corners. The base of the wall is braced by the concrete floor and the top of the wall is braced by the floor joists. The mortar joints are weaker than the masonry blocks.

There are often tell-tale signs a masonry block wall is in danger of failure. Inward bulging or bowing of a wall is a sign the external pressure is too great. Bulging or bowing may be accompanied by lateral cracks in the mortar joints. The sudden appearance of water seepage or stains through the wall, if near cracks, is a sign saturated conditions exist outside a foundation wall. Interior finishes, such as paneling or wallboard, can hide the effects of excess ground and/or hydrostatic pressure until a sudden

The Black Box/EDR- Part 2 of 2

In the first part of this article featured in the December 2005 newsletter, we discussed the basic functions of an EDR. This article will focus on how an event data recorder (EDR) is able to store specific dynamic vehicle parameters during a crash as well as pre and post crash parameters.

There are several computers in modern vehicles. Examples include the engine management module, vehicle stability control module, antilock braking module, and traction control module. All of these modules "communicate" with each other along a common/shared data bus network. This data bus functions as a gateway for the information being communicated.

The EDR also operates on the data bus. It functions as an electronic recorder of data being transmitted along the data bus. Any system that utilizes the data bus has the ability to be recorded/stored by the EDR.

EDRs record the crash pulse. Crash pulse is the change in velocity in relation to how long (in time) this velocity change takes place once the crash event starts. In other words, it's not how fast you are going, but how fast you stop.

For example, if you are traveling down the highway at 55 mph and come to stop at an exit ramp, your velocity change or delta V is 55 mph. If this stop occurred quick enough, this would be recognized as a crash.

The following is an example of EDR implementation in accident reconstruction of a single vehicle crash. There were two occupants in the vehicle when the vehicle spun around and struck a utility pole with its rear end. When first responders arrived, the female occupant had already extricated herself from the vehicle and claimed she was the passenger at the time of the accident. Her injuries, a broken neck, were consistent with her being a belted occupant in the vehicle. The male occupant who was ejected from the vehicle sustained massive internal trauma and was found deceased by the first responders. The information obtained from the EDR was inconsistent with the female's claim of being seated in the passenger seat. Data from the seatbelt sensor said that the driver's seatbelt was engaged and the passenger wasn't belted and was ejected. The information retrieved from the EDR showed that the female occupant was in fact driving the vehicle which was inconsistent with her initial statement.

Engineer Spotlight

Michael J. Zazula, C.F.E.I., Mechanical Engineer

Prior to joining Plick and Associates, Forensic Engineers, Mike Zazula was a Product Analysis Engineer for Volkswagen of America, where he investigated hundreds of vehicular fires, accidents and thefts. His experience includes analysis of vehicle component burn patterns for defect/cause of fire incident, flame propagation, and flammability. He has also performed analysis of vehicle theft, occupant kinematics, vehicle restraint performance, structural deformation and component failures. In addition to providing litigation support and expert testimony, Mike has conducted national seminars in the areas of vehicle crush and deformation analysis, safety systems design parameters, and functionality. Mike is a nationally certified fire and explosion expert. He performs forensic investigations of mechanical equipment malfunctions, failures and accidents. In addition to his forensic work, Mike is a NASCAR race car driver and has driven race cars for 17 years.

Plick and Associates, Forensic Engineers New In House Service

Plick and Associates, Forensic Engineers has developed a completely objective "In House Service" for examining components suspected to be the cause of a loss. The loss can be either mechanical, electrical, structural or chemical. Insurance adjusters, attorneys, and origin and cause investigators have found it convenient and cost effective to send the subject item(s) to us with all available reports photographs and related documents.

We examine the item(s) and render an opinion within a reasonable degree of engineering and scientific certainty. Our investigation results in one of three possible conclusions:

1) The subject item(s) is the cause of the loss.

2) The subject item(s) is not the cause of the loss.

3) There is insufficient evidence and/or documentation to support the item(s) caused the loss. Therefore the cause of the loss is undetermined.

Our "In House Service" is especially useful and important when: a second opinion is desired; the dollar loss does not justify a forensic engineer going to the loss scene; the loss scene has been cleaned; or there is not a forensic engineering firm within reasonable distance to the loss scene. This "In House Service" is just one more way Plick and Associates, Forensic Engineers is working to help you get the most cost-effective results.

Plick and Associates, Forensic Engineers On The Road!

Plick and Associates, Forensic Engineers is headed to the home of country music. We are speaking and exhibiting at the PLRB/LIRB 2006 Claims Conference & Insurance Services Expo in Nashville, Tennessee April 1-3. On April 3rd at 3pm, Plick and Associates' engineer Sidney Rubin will give a presentation on lighting strikes for attendees. It is a true honor and we are looking forward to sharing our forensic knowledge with members of the insurance community from all over the country.

Shortly after returning from Nashville, Plick and Associates will be jetting across the country to speak and exhibit at the International Association of Arson Investigators' Annual Conference and Expo in Denver, Colorado. This conference is truly a wonderful opportunity for us to meet, greet, and exchange information with some of the most talented experts in the world.

Bill Alber and Mike Zazula of Plick and Associates, Forensic Engineers, were recently provided the opportunity to give a seminar to the Pennsylvania Chapter of the International Association of Arson Investigators at the Pennsylvania State Fire Academy. As part of their presentation, they provided hands-on operation and failure analysis training for gas and oil fired appliances. The program was so well received, the engineers have been asked to present to a new group in Spring of 2006.

Plick and Associates, Forensic Engineers loves to hear from its newsletter readers. Please call or e-mail us at experts@plickandassociates.com with article suggestions or feedback. Reader feedback led to the addition of this edition's Hail Damage – How to Find and Identify on Aluminum Siding article.