PLICK
Plick and Associates, Forensic Engineers

# Forensic Engineering Newsletter

Volume II, Issue II November 2006

**Look For Us At:**

- NASP Annual Conference
  November 12-15, 2006
  Orlando, FL
- IAAI New Jersey Chapter
  November 29, 2006
  Bridgewater, NJ
- Philadelphia I Day
  December 4, 2007
  Philadelphia, PA
- IAAI New Jersey Chapter
  December 5, 2006
  Egg Harbor Twp, NJ
- PLRB Annual Conference
  March 17-20, 2007
  Orlando, FL

**Joke of the Month**

An engineering student was walking across campus when another engineer rides up on a shiny new motorcycle. "Where did you get such a great bike?" asked the first.

The second engineer replied "Well, I was walking along yesterday minding my own business when a beautiful woman rode up on this bike. She threw the bike to the ground, took off all her clothes and said 'Take what you want.'"

The first engineer nodded approvingly, "Good choice; the clothes probably wouldn't have fit."

**Inside this issue:**

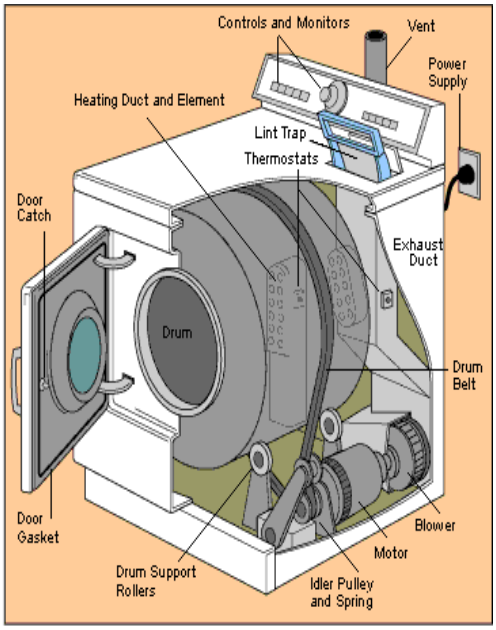


## Dryer Fires

Dryers are simple appliances to use. You place wet clothes into the dryer, clean the lint trap, turn the selector knob to the desired setting, and press the start button. However, the National Fire Protection Association (NFPA) reports there are there over 14,300 dryer fires, resulting in 30 deaths, approximately 400 injuries, and over 95 million dollars in direct property damage annually.

To understand what causes dryer fires, it is necessary to understand the fundamentals and components of a dryer. The major components of a dryer include: the drum, blower, motor, heater (either electric heating element or gas burner), controls, lint trap, and exhaust duct. Once the wet clothes are loaded in the drum, the lint trap cleaned, the drying selection made, and the start button pressed, the motor turns the drum and blower via a belt and pulley system. The blower draws in ambient air and blows the air across the heater. The heated air is then blown through the rotating drum to dry the clothes which are tumbling in the dryer. Before air is exhausted from the dryer, it passes through the lint trap. The lint trap collects lint created by the drying/tumbling process of the clothes. After the lint trap, the air is discharged to the outside by the dryer vent. A series of thermostats and limit switches control the heater. Once the preset temperature is reached, the thermostat turns off the heating element. The high limit is the fail-safe for the thermostat. If the maximum temperature is exceeded, the high limit switch will turn off the heating element.

A common cause of dryer fires is lint accumulating in the lint trap and/or exhaust. Proper airflow is critical in the drying process and the lint can inhibit airflow through the dryer. As the airflow is decreased, the heater will reach its preset temperature quicker due to the reduced airflow across the wet clothes. This will result in the clothes taking longer to dry due to the lack of airflow. This in turn will cause the thermostat/limit switch to cycle more often in an attempt to prevent an overheating condition, increasing the chances of a premature failure. With the thermostat/limit switch no longer functioning, there is greater potential for overheating of the dryer, resulting in a fire from the lint being ignited from the excessive heat.

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**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**

## What Is Fire?

The ordinary or popular definition of "fire" is found in *Webster's Ninth New Collegiate Dictionary* as: "The phenomenon of combustion manifested in light, flame and heat." Flame is defined as, "The glowing gaseous part of a fire," and combustion as, "An act or instance of burning" or "A chemical process (as in oxidation) accompanied by the evolution of light and heat." Burning is defined very simply as "Being on fire." As one can see, the terms rely upon each other for their own definition.

In the past, various authoritative sources were not in complete agreement as to the definitions of a fire. *The Random House Dictionary of the English Language, Second Edition Unabridged*, defines a fire as: "A state, process or instance of combustion in which fuel or other material is ignited and combined with oxygen, giving off light, heat and flame." Note, the stipulation that oxygen is required for combustion, which is not scientifically correct.

*The McGraw-Hill Encyclopedia of Science & Technology,* 1982 defines combustion as, "The burning of any substance, whether it is gaseous, liquid or solid. In combustion a fuel is oxidized, evolving heat and often light. The oxidizer need not be oxygen per se…." It further states: "The oxidizer may even be a non-oxygen containing material…"

A current definition of "combustion" is defined in the *Fire Protection Handbook, Nineteenth Edition* as, "An exothermic, self sustaining reaction involving a solid, liquid and/or gas-phase fuel. The process is usually (but not necessarily) associated with the oxidation of a fuel by atmospheric oxygen." Another current definition from the *Columbia Encyclopedia* is, "Fire, the phenomenon of combustion as seen in light, flame and heat." The 1991 edition of *Black's Law Dictionary, Abridged Sixth Edition* defines "Fire" as: "To dismiss or discharge from a position or employment." There is no definition for "combustion."

Combustion is a self-sustaining exothermic reaction, which is heat produced as a result of a chemical change. The reaction involves the transfer of electrons. The process requires oxidation. The material which gains the electrons is the oxidizing agent. The loss of electrons by a material is referred to as reduction. Determining the definition as it applies to the law is nearly as old as the law itself. The following 100 year old case example shows how we are still tackling many of the same questions today.

A wool company had a large quantity of woolen fleeces covered by fire insurance policies submerged for several days during a flood. The wool was in the same condition as when taken from the sheep, containing about five per cent foreign matter in the way of manure, strings, and straw. After the subsidence of the water, the woolen company endeavored to save the wool by spreading it upon floors in a building to dry.

The wool was subsequently found to be wet, covered with mud, and very heated. It was necessary in handling the wool to uses pitchforks, as the wool was too hot for the hands. The strings around the fleeces had apparently burned. There was smoke in the rooms where the wool was stored and an odor of burned wool was evident. There was no flame. The building in which the wool was stored did not burn, nor any part of it.

The wool company filed for recovery as the wool was fire damaged. The insurance company denied the claim. Their reason: "The word fire, as used in an insurance policy, in the absence of language showing a contrary intention, is to be given its ordinary meaning, which includes the idea of visible heat or light." The wool company sued the insurance company.

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# Risk Management from the Forensic Engineering Perspective, Part 1 of 2

*"The potential connection and relationship between forensic engineers and the risk manager is clear. Forensic engineering investigations Provide valuable data for the assessment and control of risk."*

Forensic engineering is defined as the application of accepted engineering practices and principles for discussion, debate, argumentative, or legal purposes. Forensic engineers investigate losses to determine what caused the loss, who is responsible, and what could/should have been done to prevent the loss. We investigate water leaks, electrocutions, fires of electrical and/or mechanical origin, explosions, furnace-puff-backs, "slips, trips and falls" incidents, automobile accidents, recreational accidents, workplace accidents and many other types of losses. In the field, we examine evidence, assess circumstances, and record observations. Applying accepted engineering and scientific principles and applicable standards and codes, the forensic engineer joins evidence with factual data, develops an opinion, and presents the findings in a written report.

Risk management involves the assessment of all loss potentials leading to the establishment and administration of loss-control programs. The goal of risk management is to reduce losses to acceptable minimums, at the lowest possible cost. The potential connection and relationship between forensic engineers and the risk manager is clear: Forensic engineering investigations provide valuable data for the assessment and control of risk. In attempting to minimize loss resulting from fire, accidents, and other natural and man-made events, risk managers can enhance their analyses and risk reduction strategies by utilizing data developed through forensic engineering.

In forensic engineering investigations, an engineer follows evidence to a logical conclusion, often uncovering information directly related to risk managers' core responsibility. Assessing risks to reduce losses to acceptable minimums, or controlling risk by anticipating and preventing the occurrence of unplanned events.

Forensic engineering investigations can provide risk managers with loss data to assist with risk assessments including loss characteristics and consequences. For example, a single-unit facility poses different risks to a risk manager, in both type and potential magnitude if risk, than a multiple-unit commercial or industrial facility. A loss in a single-unit facility may have a limited set of possible causes dictated by the relatively limited scope of the building and potential loss scenarios.

A large commercial or industrial facility, however, presents a different set of risks and loss potential.

A simple example is an older facility constructed using previous versions of a building code, presenting a different risk than a new facility. Specifically, current codes require more electrical receptacles than prior codes. Therefore, it is conceivable an older facility may utilize more extension cords than a newer one. A forensic engineering investigation may conclude a fire was caused by a short circuit occurring in an extension cord. The use of more extension cords in an older facility could increase the risk that an extension cord could short circuit and ignite nearby combustibles. This data should be provided to a risk manager to assist in future risk assessments. In addition, fixed wiring and mechanical systems may have deteriorated.

Look For Part Two In The Next Edition

## Dryer Fires Continued From Page 1

Lint is extremely combustible; it is entrained with air and is very dry due to its location within the dryer. The heating element or burner assembly often ignites small, tiny particles of lint but due to their size and lack of heat energy, they burn out before they enter the drum. The problem occurs when the lint is not cleaned and large amounts begin to accumulate. These accumulations within the dryer are combustible and can ignite under certain conditions at less than 300 °F.
The dryer vent hose should be as short a length as possible with as few turns/bends as possible. The vent hose should also be cleaned to eliminate lint build-up. Also, any plastic dryer vent hose should be immediately replaced with smooth metal flex hose. If a lint fire would ignite in the plastic vent hose, it (fire) would breach the hose in a short period of time. The smooth metal hose is better than the older ribbed hose; due to the lint getting trapped in the ribs.
In closing the following are tips from the NFPA to avoid such fires:

1. Clean the lint trap before or after each use, and also wipe away any lint that has accumulated around the drum.
2. Make sure the dryer is plugged into an outlet suitable for its electrical needs.
3. Do not run the dryer without a lint trap.
4. Do not leave the dryer running if you go out, in case it malfunctions.
5. Make sure the air exhaust vent pipe is unobstructed and the outdoor vent flap opens readily.
6. Keep combustibles, such as boxes and clothing, away from the dryer.
7. Have your dryer inspected and serviced by a professional. Gas dryers should be inspected periodically to make sure the gas line and connection are intact and leak-free.

## What Is Fire? Continued From Page 2

The issue in question was if spontaneous combustion constitutes burning. An abstract of the court's documents stated: "Spontaneous combustion is a rapid oxidation. Fire is oxidation which is so rapid as to either produce flame or a glow. Burning and rotting are in the main processes of oxidation, a combining with oxygen: but in rotting, that operation of combining with oxygen is indirect and helped by what is called fermentation or bacterial action, usually. In the case of burning, the substance combines directly at the high temperature with the oxygen in the air, and produces the ordinary effect of burning in the stove." The judge discharged the jury and ruled in favor of the insurance company. The ruling was appealed, but the wool company once again lost the case. In part, the ruling stated "…the plaintiff has not shown any direct loss by fire as that word is used and known to the public generally. Fire is always caused by combustion, but combustion does not always cause fire. The word spontaneous refers to the origin of combustion. It means the internal development of heat without the action of an external agent."
The ruling also stated, "Combustion, or spontaneous combustion, may become so rapid as to produce fire; but, until it does so, combustion cannot be said to be fire." It also stated, "In Webster's Dictionary, fire is defined as the "evolution of light and heat in the combustion of bodies." No definition of fire can be found that does not include the idea of visible heat or light, and this is also the popular meaning given to the word."
The judicial rulings attribute the initial stage of the process of spontaneous combustion as "rotting" and assisted by fermentation and bacteria. One can deduce that until the process of spontaneous combustion can inflict damage to anything external to the product experiencing spontaneous combustion, and at the same time exhibit visible heat or light, it is not yet a fire.
The definitions of fire and combustion are not completely clear; there is no question that they will continue to be prominent legal issues for sometime.

## Plick and Associates Race Into Pocono

Congratulations to Michael J. Zazula, C.F.E.I , of Plick and Associates, Forensic Engineers, for his stellar performance in the ARCA/REMAX racing series' Pennsylvania 200. The 79 car moved up 10 places in the 88 lap race to the delight of a large group of supporters there to see Mike. With plans on participating in more ARCA/REMAX races, Mike has been presented with the opportunity to move up to NASCAR's Busch Series races. Mike is sure to give us many more thrilling moments.

## Engineer Spotlight

**Sidney Rubin, P.E., C.F.E.I., Electrical Engineer**

A renowned forensic investigator, Sid Rubin has over 45 years of engineering experience with approximately 25 years of forensic engineering experience, where he conducted thousands of investigations. Sid has worked as a supervising and consulting engineer in a variety of capacities and has extensive experience investigating electrical/mechanical failure and fire investigation, electrical design, product defects, power plant and electrical distribution systems, and code compliance. He holds a BS in Electrical Engineering from Drexel University, and an MS in Mechanical Engineering from Villanova University. Sid has conducted numerous lectures and seminars and has been an Adjunct Professor of Electrical Engineering at Drexel University for over 20 years. He is a licensed Professional Engineer in the states of Pennsylvania, New Jersey, New York, Delaware, Ohio, Michigan, Virginia, Georgia, Maryland, and the District of Columbia. In addition to being a registered engineer, Sid is a nationally certified fire and explosion investigator.
Sid served honorably in the United States Army, is a past president of his Civic Association, and holds a black belt in Tang Soo Do Karate. Sid and Harriet, his wife of almost fifty years, have four married children and six grandchildren.

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.

# Plick and Associates, Forensic Engineers On The Road!


**Plick and Associates, Forensic Engineers, are just back from Cincinnati, OH, this year's home for the International Symposium on Fire Investigation Science and Technology Annual Conference. Shown above is Sidney Rubin, P.E., C.F.E.I. giving his presentation entitled "What Is Fire?" Even to this group of seasoned professionals, the presentation provided the attendees a new look at fire from the engineer's perspective.**


**In September, Plick and Associates, Forensic Engineers, were on the road once again giving presentations at three conferences. The first was at the National Association of Subrogation Professional's Eastern Chapter Conference in Allentown, PA on September 21st. Then, on September 27th, speaking at the Execusummit Small Property Loss seminar, held in New York city. The presentation topics were, "A Primer in Electricity for Small Property Loss " by Sidney Rubin, P.E., C.F.E.I., and "Water Heater Investigations" by Michael Plick, P.E., C.F.E.I. Also, on September 27th 2006, William Alber, a renowned H.V.A.C. expert, gave a presentation entitled "Heaters and Boilers", to the Pennsylvania Chapter of the International Association of Arson Investigators.**

**The Plick and Associates, Forensic Engineering Newsletters are now available online! Go to http://plickandassociates.com/newsletters to have access to all of the previous editions.**

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