Electrical Forensics Engineering

An Online Continuing Education Course for Engineers

Course Number: E-4074

Credit: 4 Hours / 4 PDH / 4 CPD

Electrical Forensics Engineering

Table of Contents

List of Tables and Charts

List of Drawings

1. Introduction

The original meaning of Forensics is from the Latin word **forensis,** which means "of or before the Forum." In Roman times, a suspected criminal would be tried before a group of people in a public debate. Both the suspected criminal and his accuser would give their side of the story in front of the group of people, who would then render a verdict based on what the two orators said. It is quite possible, in this kind of trial, that the party who was judged right was only the party who could speak the best. Justice was not necessarily served. There are two modern meanings of the word Forensics. They are 'a category of public presentation' and 'a form of legal evidence.' In this course, we are using forensics as the application of science to answer questions of interest to the legal system. Specifically, we will be concerned with Forensics investigations in the Electrical Engineering field.

We have come a long way from the original meaning. We are now interested in studying the cause of failures by a scientific investigation of the evidence left behind after a failure. This can be difficult because the evidence is often destroyed or damaged by the failure or the results of the failure. However, today's investigators are often able to determine, with a fair degree of confidence, the probable, possible, and sometimes definite cause of failures. They employ modern scientific methods which use microscopes, including scanning electron microscopes, x-rays, laser devices, chemical analysis, and close studies of the evidence left behind after a failure. These investigators are employed by insurance companies, law enforcement authorities, and the courts. Electrical engineers in the Forensics field are limited to making testimony only in their field of expertise. We cannot testify as a Certified Investigator, only as a Professional Electrical Engineer. In the case of fires, we can only say that an electrical event could have or could not have been a competent ignition source. And then, we use the terms' possible' or 'probable' or rarely 'definitely.' Our opinions will be questioned and disputed by opposing interests. Therefore, we must have a real understanding of the basics of electrical theory. We must also have a practical understanding of the effects of electrical energy on materials, equipment, and the human body. And there is often a "sixth sense" that doesn't tell what happened in an event but instead points our noses in the direction to look when investigating a case.

2. Some History

One of the early documented cases of Forensic science was by Archimedes, who lived from 282 to 212 BC. By using the displacement of water by a crown, he could determine that it was not made of pure gold as was claimed. In this case, it was not possible to melt down the crown and determine by volume whether the crown was pure gold or not. Archimedes determined the volume of the metal in the crown by how much water it displaced and then determined by its weight that it was not pure gold.

In the seventh century, fingerprints were use to an Arabic merchant, Soleiman d then be given to the lender. T

The first writt criminal cases is attributed to th ritten in Song Dynasty China on murdered with a sickle wa ld have caused the death to bring eventually gathered on a sing offered advice on how to distingu oken neck cartilage), along wi was caused by murder, suicide,

In sixteenth-century E iers in army and university settings began to gather information on the cause and manner of death. Ambroise Paré, a French army surgeon, systematically studied the effects of violent death on internal organs. Two Italian surgeons, Fortunato Fidelis and Paolo Zacchia laid the foundation of modern pathology by studying changes that occurred in the structure of the body as a result of the disease. In the late 1700s, writings on these topics began to appear. These included: "*A Treatise on Forensic Medicine and Public Health*" by the French physician Fodéré and "*The Complete System of Police Medicine*" by the German medical expert Johann Peter Franck.