

the electrical digest

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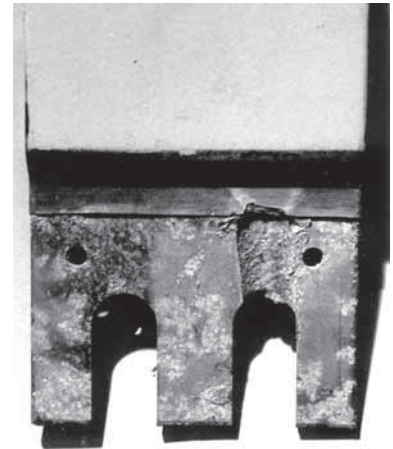
Electrical Failures **Causes and Liability**

The heart of virtually any larger industrial plant is its heavy electrical equipment such as transformers, switchgear, generators, cables and other electrical power apparatus. But any of these is subject to failure - failure which can result in multi-million dollar losses.

It takes highly specialized forensic engineering techniques to establish cause and the reason for failure in the majority of these cases. While determination of the cause usually provides evidence in insurance settlements, forensic engineering goes further. Liability: who, or what was responsible, and why. This vital evidence must be established as well to assist the legal professionals who become involved in determining degrees of responsibility for the protection of all concerned.

In the case of a piece of faulty equipment, it might be the installation contractor at fault. The blame might rest on the equipment's manufacturer. It may have been the responsibility of the equipment's owner - or it could be a combination of these factors.

Insurance and failure investigations involving electrical failures regularly use specialized forensic engineering techniques to uncover the technical evidence and provide detailed reports in these and many other types of cases.



Tin-plated aluminum bus duct showing failure at joint due to corrosion. The corrosion resulted from the formation of aluminum oxide and aluminum hydroxide, caused when seepage of water leached alkalis from a fresh concrete floor.

Selecting a Forensic Engineering Team

There are certain essential requirements for an effective forensic engineering team. Selection of such a team must consider its:

- * experience in testing and inspection
- * knowledge and understanding of codes and standards
- * test equipment and laboratory facilities
- * electrical, mechanical and chemical engineering capabilities
- * data base and research library
- * state of the art analytical techniques

The forensic engineers and other electrical specialists comprising these teams are often called upon to present evidence in court, and to provide expert testimony.



Some Case Histories . . .

A recently installed bus duct failed during the construction of an office tower. Brosz' forensic engineers were asked to determine why.

The bus duct, rated at 1600 amperes, failed at 100 amperes. Several questions arose concerning liability: was it the manufacturer's fault? Was it the electrical contractor's fault because of improper installation or incorrect specification? In this instance, neither was at fault.

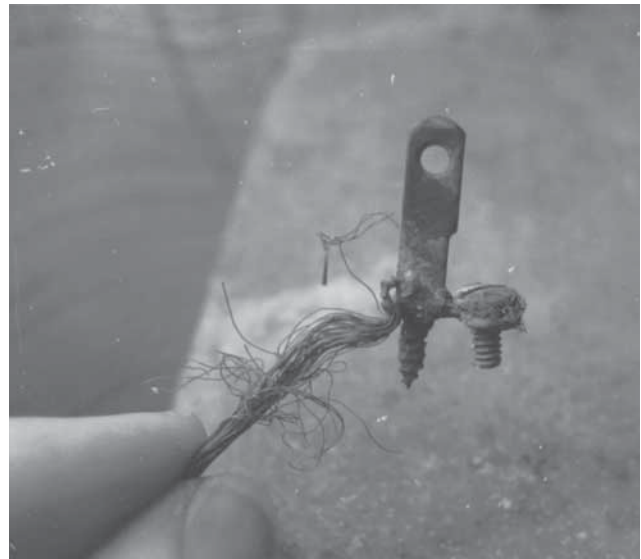
Intensive forensic investigation showed the cause to be seepage of water. During the building's winter construction period, water seeped in, leaching alkalis from the fresh concrete floors. This subsequently caused corrosion to the joints of the aluminum bus ducts.

A law suit between the electrical and general contractors for damages resulted from the investigation.

Forensic engineers deal not only with complex electrical apparatus investigations, but sometimes with electrical loss involving simple domestic appliances.

As an example, while undergoing renovations during the winter, a summer cottage was severely damaged by fire. The cause was believed to be the contractor's electrical heater. The contractor blamed the cottage owner's extension cord, claiming it had been faulty.

Lawyers involved in the case retained Brosz' forensic investigators to establish the cause.



Blade of plug in heater cord where broken copper strands resulted in arcing, creating temperatures reaching 1082°C. Molten copper droplets are evidence of 38 of 64 strands welded to the blade. This failure caused a cottage fire.

Careful investigation showed the contractor's heater cord, not the extension, was at fault. Of the 64 copper strands in the cord, more than half were found to have been broken and molten before the fire, proving overheating and subsequent arcing.

The temperatures in a normal fire are not high enough to melt copper. Only an arcing situation could create sufficient heat - more than enough to start the cottage fire.

Brosz' engineers' report of this fire investigation was used by the law firm as the basis for settlement.

Forensic Engineering as an Adjunct to Legal, Insurance Activities

Legal and insurance professionals involved in the specialized areas of errors and omissions coverage, frequently use technical services such as those provided by a forensic engineering team.

This team's technical and analytical capabilities often are enlisted to review the design of electrical equipment in order to uncover possible errors in that design or its application.

In one such case, an apartment complex supplied by two power transformers, received \$100,000 damage when one of them failed.

It was determined by the forensic engineering team that, in the transformer's application stage, the Canadian Electrical Safety Code had not been met. An incorrect diversity factor of electrical loads had been applied, resulting in a serious transformer overload.



The Canadian Electrical Safety Code is regularly updated and electrical inspection department bulletins are issued as supplements.