Preservation of Evidence in the Face of Testing and Examinations

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The title of this article is misleading, as it may not always be possible to preserve the evidence when testing is performed (i.e. - destructive testing). It may be necessary to perform destructive testing or examinations in order to accurately determine the specific cause of the failure, particularly for more complicated devices with many parts. For example, if a clothes dryer has been involved in a fire, with the apparent failure located within the dryer enclosure, it would be necessary to disassemble the dryer to determine what failed. Depending on what the failure involved, the very disassembly of that dryer cabinet could later be considered to be a destructive examination. This article will discuss some ways to ensure that potential conflicts or issues are minimized.

Reasons for Examinations and/or Testing

Where a loss has occurred and a device, part or appliance is suspected to have caused or contributed to a loss, it may be necessary to examine and potentially test the item to confirm that was the case. Some examples include:

- stoves, coffeemakers, microwaves alleged to be involved in a fire
- lap top computers and other rechargeable battery driven devices alleged to be involved in a fire
- industrial equipment alleged to have malfunctioned, resulting in a fire, injury or loss of product
- ladders alleged to have failed, causing someone to fall and become injured

Chain of Custody

The first step in ensuring a successful case is to document the chain of custody. Failure to do this could result in the other party claiming that the damage to the item or the reason why the item is no longer performing properly was caused by the handling of the item *post-loss*. (see Evidence in Insurance Losses for a more detailed discussion of this subject)

Item Identification

It is important to note the make, model, serial number and any other features that will allow for the proper identification of the manufacturer of the item so that they can be put on notice, if required. This seems like an obvious point, but it is surprising how many times we have been asked to find out why something failed before the manufacturer has been identified. An equally important reason to identify the manufacturer is so that you can provide them and any related parties (suppliers, installers, distributors) with adequate advance warning of the intent to perform potentially destructive examinations and/or testing and invite them to attend. For some reason many manufacturers now use adhesive labels which disintegrate in a fire - hmmmm…….

Determine Possible Failure Scenarios

It may seem like “putting the cart before the horse” to come up with some ideas of how the item could have failed, prior to examining it for the purpose of more conclusively determining that very point. However, different failure scenarios could result in different consequences for that item, which may require different investigation techniques. For example, if the loss is suspected to involve an electric circuit breaker, such as you can find in your house electric service panel, possible failure scenarios could include:

- the device failed to trip due to an internal part that broke
- the device failed to trip because one of the internal parts had deteriorated
- the device did trip but the flow of electricity was not interrupted because the internal contacts had fused together
- the circuit breaker was the incorrect size for the electrical circuit

The last scenario would be verified simply be examining the size of the wires that the circuit breaker supplied - the breaker probably would not need to be tested. This is a great example of why it is important not to look just at the evidence, but the surroundings it is in, how it was connected or positioned, etc. If you simply deliver the breaker to a forensic engineer to see why it failed, a crucial piece of documentary evidence would be missing and money might be wasted following the incorrect investigation path. The other three scenarios could each be approached differently, but until one knows which scenario is more likely, the examination and/or testing should try to cover all possible scenarios. One example would be to x-ray the breaker, to discover, if possible, what condition the metal components appear to be in. If the contacts are not fused, that should be apparent. If parts are broken, that should be apparent. Then, the next steps can be decided upon.

We recently were engaged to determine the cause of a washing machine flood. Based on the insured’s description of the flooding event, we suspected what might have caused it; a disconnected hose to the water fill switch. However, because that particular hose could easily be disconnected, we did not perform any disassembly on the machine until representatives from the manufacturer were present. In fact it turned out that the hose was disconnected, and could only have become disconnected due to a manufacturing problem (not a user problem). Because we did not perform any disassembly on the unit, there was no dispute as to whether or not we had (intentionally or otherwise) caused the hose to become disconnected.

Non-Destructive Testing

There are a variety of non-destructive tests (NDT) that can be employed in many instances, especially when the failed item is a simple device, such as failed pipes or hoses, failed couplings, failed steel building elements, etc. Some of these NDT include x-ray, dye penetrant testing, magnetic particle testing (MT) and scanning electron microscopy (SEM). However, there is a limit to how much information can be obtained from such NDT. For example, with metal materials it may be necessary to cut small samples from the evidence to perform more detailed metallurgical examinations. These samples are mounted and polished to show the composition and underlying microstructure of the metal. This can reveal if the metal was properly cast/forged/extruded, etc. These small samples, may not qualify as true “destructive tests”, if the evidence has essentially not been destroyed (e.g. - if the

evidence is a large steel beam that failed, removing a small sample from the other end of the beam, away from the specific failure site, will effectively not alter the evidence).

Develop an Examination and Testing Protocol for the Subject Evidence

A protocol provides a clear and specific set of examinations and tests which can be distributed to all interested parties for discussion and (hopefully) consensus, prior to any work beginning. This limits the ability of any one of the parties from claiming, after the fact, that the evidence has been spoliated. It is often through the development of the draft protocol and the subsequent discussions that potential problems are discovered and hopefully eliminated. However, even the best laid plans can go awry, so sometimes on-the-spot changes are required during the examination and testing phase.

The protocol should be very specific and should describe any steps which could potentially affect the condition of the evidence. Simple things like the mode of transport of the evidence to the test facility could be very important. If the evidence is susceptible to damage from extreme cold, for example, and it is shipped in the middle of the winter to a test facility and kept in an unheated storage area until the scheduled test date, the evidence could be spoliated. If the protocol had described the transport and storage conditions, and if the protocol was distributed to the manufacturer of that item, they should make it known that the evidence is susceptible to damage from exposure to extreme cold conditions. Otherwise the manufacturer would have difficulty making a claim for evidence spoliation.

Documentation, Documentation, Documentation

If “Location, Location, Location” is the catch phrase for successful real estate ventures, then “Documentation, Documentation, Documentation” is the catch phrase for successful handling of evidence, from its removal from site through to its examination, testing, eventual long-term storage and finally its use in the resolution of the matter and its ultimate disposal. This means that good notes, diagrams, photographs and even videotaping may be required. Some of this is discussed in the articles entitled Evidence in Insurance Losses and also Subrogation Issues - An Engineer’s Perspective.

It may not be possible for the evidence to be removed from the site without some alteration of its immediate post-loss state. For example, if the evidence includes severely fire damaged components, simply transporting it away from the scene may cause it to deteriorate badly. In such cases, copious notes and/or photographs are a must. It may also be advisable to notify potential other parties immediately, so that they can examine the evidence in-situ. Further examinations and testing may be required later in a laboratory setting, but at least the other parties can not claim any prejudice if the condition of the evidence changed during removal and transport away from the scene.

During the laboratory examination and testing, even if all relevant parties are present, it is important to document the relevant findings through each step of the process. This minimizes the opportunity for another party to gloss over or ignore critical findings that may factor in to the final conclusion as to cause. There is nothing worse than to get to the end of a machine disassembly and find something different from what is expected, only to realize that the relative position of certain switches or valves may have explained why the findings were different. A well documented examination will maximize the chances for success in your case.