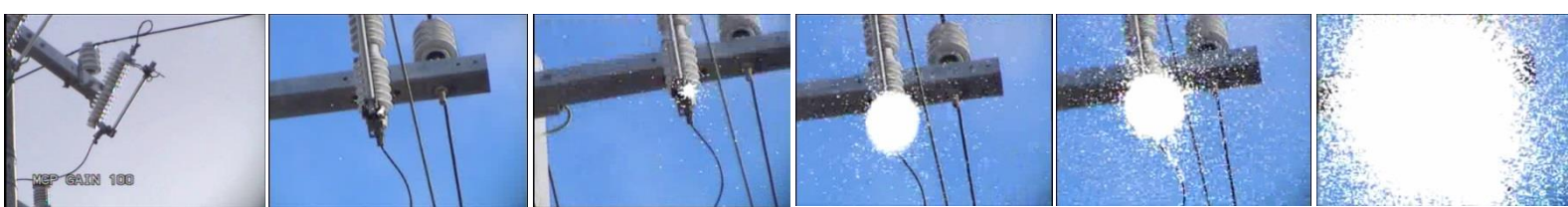


CASE STUDY

Location: Distribution Fuse

Issue: Flash-Over

Ambient conditions: Wet condition



Q. Why is this fuse not blowing and causing an outage?

A. The flash-over is occurring "outside" of the fuse in the barrel. Therefore, no current is flowing through the fuse but rather over the entire switch. Hence no fuse is blown.

Q. Why isn't some upstream protection device operating as it is surely seeing the fault current associated with each flash-over?

A. With "distribution" protection schemes are not highly engineered. We can assume that the magnitude of the fault current isn't very large. This is a reasonable assumption given that the system is distribution (not transmission), the fault current is not through a "bolted" to ground connection but is reaching the ground through an arc, and the arc extinguishes as the fault current increases. Under wet conditions, when the video was taken, the fault current dries the water off of the switch and then the arc extinguishes. This means that the fault current isn't large enough to sustain the arc.

If the distribution feeder is protected by a fuse at the substation, then it may take some time before the fuse sees enough current to actually blow. A fuse that is repeatedly subjected to very short blasts of fault current will eventually blow, but it may take quite a bit of time

Most distribution feeders are protected by a breaker at the substation, rather than a fuse as discussed in (1). Often, an Oil Circuit Recloser (OCR) is actually installed, but the term breaker is used. If a breaker is actually protecting the distribution feeder in the substation one of two things is happening: Either the fault current simply isn't large enough for the OCR to "pick-up" (detect the fault) or the "times pick-up" setting needs to be reset. Protection engineers need to review their settings.

One needs to be extremely careful when setting breakers to operate for fault currents that aren't very much larger than load currents. If the OCR operated for every flash-over, this would be extreme nuisance tripping. However, without an outage, how does the utility know that there is a problem?

Q. How did the utility know that they had a problem?

Finding the problem is extremely challenging - these guys are very grateful that they have a DayCor.

If a fuse is being used as discussed in (1) it will need to be replaced. It is also recommend that the lightning arrester installed at the switch are also replaced, as the internal disks have seen the fault currents associated with each flash-over.