

IFD Case Study:
Southern Maryland Electric Cooperative Inc.
by William Atkinson

"I wish we had something like this when I was a lineman." So states J.R. Grow, Job Training and Safety Manager for Southern Maryland Electric Cooperative (SMECO) in Hughesville, Maryland. Grow is referring to Internal Fault Detector (IFD) technology, manufactured by IFD Corporation. "Once I saw a demonstration of this product, I became very excited about it," he recalls. "I used to be a lineman. When you have a transformer fuse cut-out explode in your face and a faulty transformer dump hot oil on you, it isn't something you want to experience again. IFD technology is the greatest thing since ice cream."

IFD Technology

When fuses blow and reclosers are open, it can be difficult to determine whether to try to get the transformer functioning again. Questions must be addressed: Is it just the fuse that has blown and needs to be replaced? Or has the transformer faulted?

IFD Corporation's Internal Fault Detector (IFD) answers these questions decisively and quickly. The IFD is designed to improve lineman productivity, customer service, and lineman safety concerns and issues associated with transformer failures.

The product contains a sensor, which responds only to internal transformer faults. The sensor is a specialized membrane that responds to a rapid rise in pressure in the air above the oil, which occurs only during an internal fault. That is, the membrane does not respond to pressure changes due to increased loads or rising temperatures. As such, it does not result in "false positives." When the membrane moves due to an internal transformer fault, it releases a spring-loaded, readily visible indicator (an orange "flag") on the outside of the transformer tank.

IFD technology is mechanical; it requires no power supply, is insensitive to the transformer's electrical environment, does not depend on the electrical status of the transformer to operate, and does not react to electrical fields or magnetic fields.

To prevent accidental "tripping" of the mechanism during delivery and installation, the IFD is equipped with a plastic shipping lock that can quickly and easily be removed once the transformer is mounted on the pole.

When linemen see the distinctive indicator flag on a transformer, they know the unit is faulty. As such, they do not need to waste time trying to re-fuse the transformer or place themselves in danger by attempting to re-fuse it. Instead, they automatically arrange for its replacement.

An added safety feature is that the IFD cannot be reset from the outside of the transformer after it is triggered. In this way, if a lineman is working on an IFD-outfitted transformer that is not functioning, and if the indicator "flag" is not showing, the lineman can be assured that

the transformer has not faulted.

The IFD can be installed in transformers as they are being manufactured. As such, the IFD-outfitted transformers can be mounted during new construction projects and also during replacement of transformers that are retired. However, IFDs can also easily be installed (retrofitted) in actively-operating transformers, requiring only a punched hole to install. As such, utilities can easily retrofit their existing transformers with IFDs when they are returned to stores, refurbished, or rebuilt.

IFD Applications

A SMECO vendor, Utility Sales Associates, introduced IFD technology to SMECO in the late summer of 2005. "The vendor arranged to have IFD representatives visit and talk with me and J.R. Grow," explains Mike Barringer, Distribution Engineering Director for SMECO. "After the presentation and discussion, we realized this was something we were interested in."

Barringer and Grow saw a number of benefits. The most obvious benefit is improved safety for linemen working in the field. Faults are the most common cause for transformers to malfunction. The external expulsion fuse may have blown, however it might not have been fast enough to prevent internal damage to the transformer. "If this is the case, hazardous situations 'lie in wait for you,'" cautions Barringer. Barringer has been in the utility business for 25 years. He has been out in the field on storm duty and seen transformers blow up when they were closed in upon. "It's not a pretty sight," he recalls. "While infrastructure, including transformers, was destroyed, the real concern was that the linemen were placed in danger."

"The safety goes without saying," adds Grow. "Anything we can possibly do to make our system safer for our linemen is important to us."

Another benefit relates to the economics of work efficiency and getting power restored in as timely a manner as possible. "We realized that the technology was not only electrically feasible, but that it was also a time and money saver," explains Barringer. "When a transformer is not operational, it takes time and effort to reconstruct everything and restore power. Keeping the power on is very important these days, especially when outage times are measured and tracked." Barringer realized that IFD technology, because of the information it provides, can significantly reduce the time required to get power restored.

Grow agrees. "Besides improving safety, IFD technology saves time," he states. "You don't have to conduct a turn test ratio on the transformer to see if it is still good. When you see the orange indicator, you know the transformer has experienced a fault, so there's no guesswork and no time and expense needed to test it. You simply take it down and replace it."

On transformers without IFD technology, the only way to find out for sure what was causing a problem was to do a turn test ratio. "That was difficult, time-consuming, and expensive to do in the field," states Grow. "As a result, our alternate method was to re-fuse the

transformer and try it again. If it shorted out, it just made things that much worse."

IFD in Place

Currently, SMECO has IFD technology in place in a number of its small (15 kVA) pole-mounted transformers, which were purchased from ERMCO, a transformer manufacturer that works closely with IFD Corporation. "ERMCO installed the IFDs in the transformers for us," states Barringer. SMECO initially purchased nine IFD-outfitted transformers in October 2005 - three for each of its regions. One of the regions has already installed their three new transformers, and the other two will be doing so in the near future.

Explaining the technology and its benefits to the linemen was easy. Barringer and Grow visited the regions late in 2005 and explained IFDs to the linemen at the company's monthly safety meetings. "It wasn't difficult to explain to them at all," recalls Grow.

Barringer and Grow are so committed to the technology that they would eventually like to see IFD units installed on all of SMECO's overhead pole-mounted transformers. "At this point, we are not doing any retrofitting," explains Barringer. "In this way, it's not labor-intensive for the linemen. Rather, we are buying new transformers with the IFD technology already installed. We are using them when we replace transformers or when we do new construction." However, Barringer emphasizes that retrofitting is not that difficult for utilities that want to utilize that option. "All that is involved is just removing the top of a transformer, installing the IFD, which is easy to do, and replacing the top."

Recommendations

Barringer and Grow are not only excited about the increased use of IFDs in their own utility, they encourage all other utilities to consider the technology. "I wholeheartedly recommend every utility to look into this technology," emphasizes Barringer.

Grow agrees. "I would recommend this to all utilities. If you've ever had a transformer blow up in your face, it shouldn't be too difficult to see the benefits of the IFD."

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