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The Domino Effect

Find the Problems That Cause Bigger Problems

by Jeffrey L. Gadd

Infrared inspection of electrical distribution and other critical equipment is a cost-effective, proactive way to protect your company's assets. Electrical infrared thermography can be a maintenance manager's crystal ball - allowing him into the future. As thermographers, we find many problems from minor to severe. Sometimes, we find problems that I like to call "Show Stoppers" which can cause a chain reaction of production failure... or the Domino Effect.

Proactive vs. Reactive

Taking a proactive approach to maintaining your company's assets by having an infrared inspection performed is an easy choice. Exact return on investment (ROI) varies with each operation, but is at least 4:1 or \$4 return on every \$1 invested. Even if I weren't involved in the infrared service industry, I would buy stock in this. Where else could I invest \$1000 and get a \$4000 return?

The insurance industry believes in infrared inspection and is becoming a major driving force in the industry. Insurance companies are very good at making money, so the fact that they are increasingly interested in infrared inspection provides a significant clue as to its value. Many companies would be wise to take note of this trend. As a condition of the policy, some insurance companies require annual infrared inspections along with annual fire system testing. They offer discounted premiums to get you to conform or increase your deductibles or premiums if you do not conform. Insurance companies minimize their risks by requiring or "encouraging" facilities to perform IR electrical surveys.

The reactive approach to maintenance can only be described as 'Run to Failure' and is obviously not the correct method. How many of you reading these words are currently working for, or have in the past, worked for companies that use this reactive approach? A machine or line goes down and the parts needed are nowhere in sight. All of a sudden, money is no object, you find the part three states away and have it expedited 1st class on AirForce One. To borrow a line from Jeff Foxworthy, Your company might be reactive...

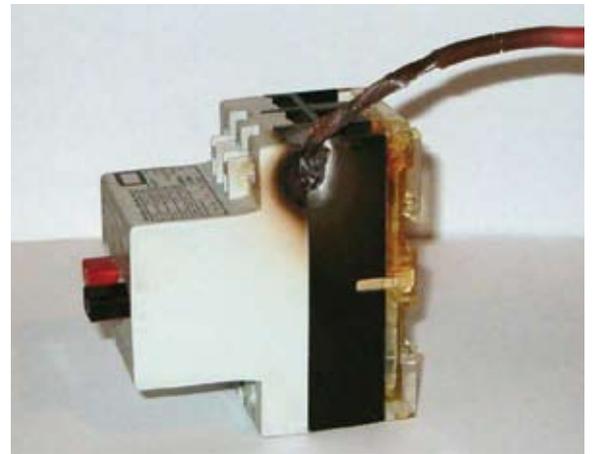


Figure 1 - Damaged Electrical Component

...if you open your electrical cabinets and see an image like this (Figure 1).

This is not necessary and could have been prevented. It actually took many months for the component to reach to this point. Did the company save money by not having an infrared inspection performed? Absolutely not. The machine was down for 36 hours while the part was found, shipped, received, installed and put back on-line. Most successful companies have annual or semi-annual infrared inspections performed either by in-house technicians or contractors. Infrared cannot find or eliminate every problem, but if your competitor is doing proactive maintenance by using infrared and other PDM technologies and you are not, then your company's future could be quite dim. I have yet to meet a customer who regretted having an infrared inspection performed. Your operation can't afford NOT to use infrared.

Crystal Ball

Once a maintenance manager has his/her infrared report in hand, it can serve as the crystal ball of the health and reliability of the electrical and mechanical systems. He/she is aware of the problems yet to come. Armed with this information, they can allocate the appropriate people and resources to make corrective actions - before a failure occurs. No one wants the light [heat] shining on himself or herself when there is an outage or catastrophic failure which could have been prevented. Scheduled downtime to make necessary repairs is much more palatable to management, especially when you have a graphic report of a potential problem with pictures. How better to show your superiors that you were on the ball, avoided downtime and the exponential costs associated with it, and how nice it is to take these reports to your next job review.

Domino Effect

The domino effect is when one event has a cause/effect on something else and so on. The sample shown in Figure 2 represents a one page thermographic report that was part of an electrical IR survey that we performed in a Midwest commercial bakery, which operates three shifts. This sample was a real "Show Stopper". It would have had a catastrophic impact on the business operations at this facility. An interruption in power here would have shut down the conveyor in this bakery. If this conveyor shuts down without warning, it will create the following Domino Effect. [These are the exact numbers that the engineer at bakery gave me.]

Assuming 4 hours downtime:

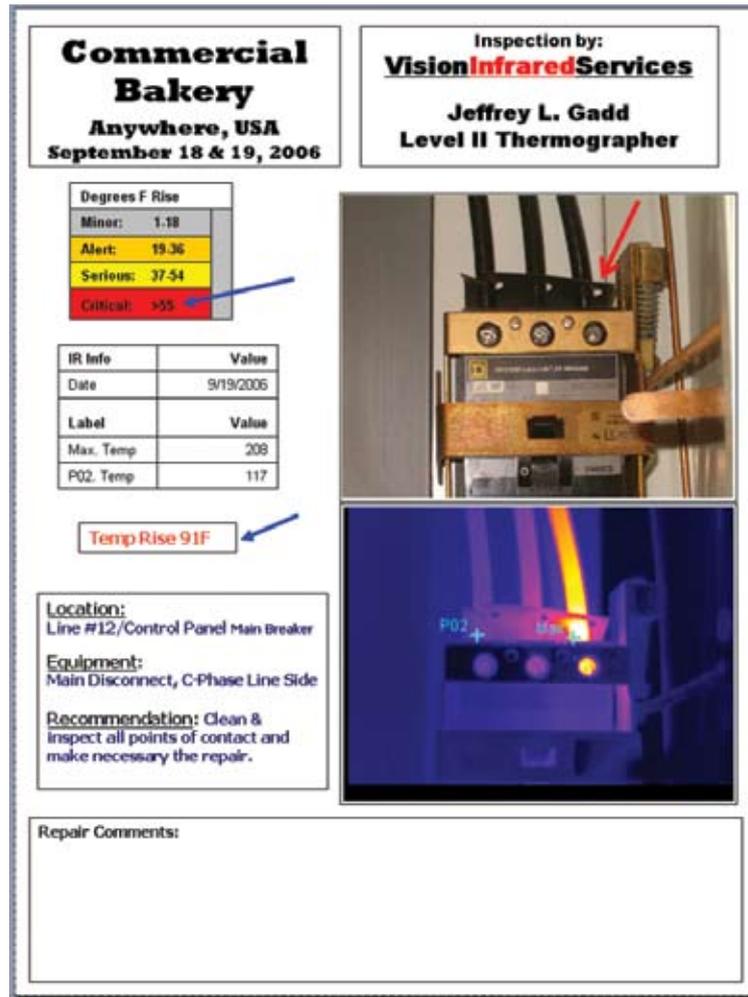


Figure 2 - Typical Thermographic Report

1. The bakery will lose the entire contents of the oven and all contents on the conveyor line.
2. Cost of 40 production workers while repairs are made.
3. Cost of 6 maintenance workers to make necessary repairs.
4. Lost production
Cost per hour of downtime = \$10,000, which includes expenses and lost revenues. Minimum Total Cost Avoidance for 4 hours = \$40,000
5. Worst-case scenario. The oven can't cool down fast enough and the oven band (conveyor) could be destroyed from the heat while sitting idle in the oven. This is rare, but has happened and the cost is \$15,000 for the band along with 2 ½ days

of downtime at \$10,000 per hour. So, the worst case cost for 60 hours of downtime plus oven band = \$615,000.

This was the most severe problem found during the two-day inspection, but by no means the only problem. A total of 33 problems were found, of which we have only assigned cost avoidance to this one. The costs would obviously vary depending on impact to this business, but let's say we assign a \$300 price tag to each problem. This equates to \$9,600 for the other 32 anomalies. So, along with the "Show Stopper", we get a total cost avoidance of \$49,600 during a two-day infrared inspection.

Conclusion

In today's competitive world, taking a proactive approach is the only feasible means to maintain a company's assets. Using infrared inspections as well as other PdM technology can benefit a company and keep the heat off the maintenance professional. A company taking the reactive approach can only expect to struggle to survive, while their competition uses these technologies to strive ahead. Having a "crystal ball" is priceless when maintaining a facility. Not every problem found with infrared is a Show Stopper, but it only takes one. If your facility hasn't had an infrared inspection or it's been a few years, I urge you to become proactive and have it done ASAP. It only makes "cents" to save a whole lot of dollars.

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