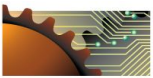


# Infrared Thermography — Revealing the Hidden Risks

RISK CONTROL



CALIFORNIA  
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**CNA**

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### Infrared Thermography Saves Energy and Avoids Losses

While electrical systems are among the most reliable equipment, they do require periodic maintenance and inspection to continue to supply power to buildings and facilities in a safe and efficient manner. That's why CNA has been offering infrared (IR) thermography tests to new and existing clients with total insured values (TIV) of \$10 million or more per location. When it comes to providing the advanced diagnostic services our clients need to reduce risks ...

**we can show you more.®**

#### How IR thermography works

Everything with a temperature above absolute zero releases thermal, or infrared, energy. The light composed of this energy isn't visible because its wavelength is too long to be detected by the human eye. The higher an object's temperature, the greater the IR radiation it emits. IR thermography cameras can not only see this light, but can also delineate hot areas from cool areas — even when the source is hidden behind drywall or other materials. This tells us which areas of the equipment are working properly and which areas are faulty, so that we can remedy equipment problems before serious property damage occurs.

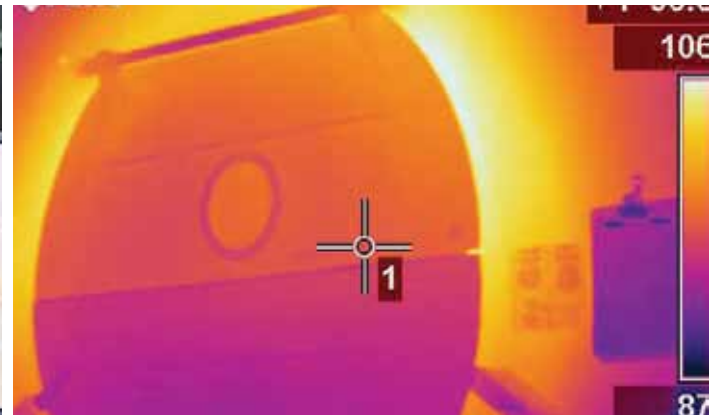
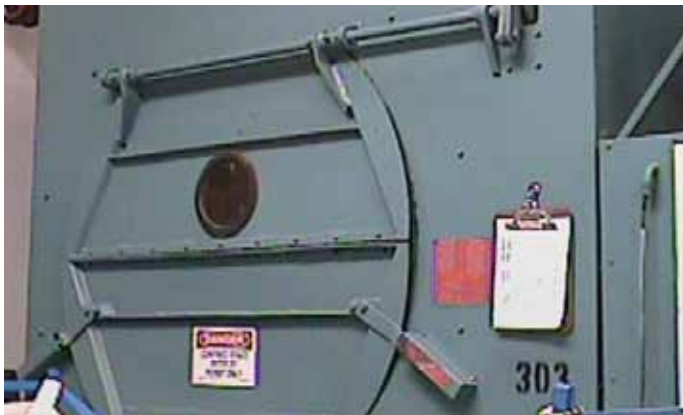
#### We focus on prevention

Insurance companies have traditionally focused on controlling the impact of property losses by using fire protection systems (such as sprinklers) to minimize losses when they happen.

Rarely is a service offered that actually helps prevent losses to save businesses real money. IR thermography is such a service. A thermal imaging scan increases confidence in equipment, decreases the chance for fire loss, reduces energy costs and helps avoid business interruption losses.

Certified IR thermographers can conduct scans on equipment to find potential problems in the early stages of breakdown or failure. Mechanical systems and key production equipment are also assessed during IR thermography. No interruption of production is typically required during the test. Section 21.17.5 of NFPA 70B-2006 edition recommends that building owners complete IR surveys annually. Other sources recommend testing every two to five years, depending on the number and level of faults found.

The value of an IR survey is estimated at \$2,000 each, based on typical experience of our thermographers. That equates to a total value of \$12,308,000.



### Success Story

#### Charred Insulation Found During Testing

CNA conducted an IR test at a fruit processing facility that had more than \$20 million total insured value, including \$4 million contents and \$10 million business interruption value. As a result of CNA's survey, which we conducted at no extra cost to the client, our thermographer identified one critical, three serious, and 10 intermediate faults. The critical fault already showed visible evidence of charred insulation. If the fault had become a fire, the facility might have lost 100 percent of its contents value due to a smoky electrical fire — an estimated \$4 million in property damage loss. The correction of the other faults saved the client an estimated \$75,000 in electrical repair costs, reduced electrical fire risk and increased energy savings, bringing the total estimated savings to more than \$4 million.

### Provide a path to measurable savings

From March 2005 through March 2010, our thermographers conducted 6,154 IR surveys, averaging about 100 surveys per month. Using 22 IR (FLIR P65 model) cameras, our thermographers found 45,172 faults (or deficiencies) for an average of 7.34 faults per report.

Electrical repair cost savings are estimated at \$500 for minor or intermediate faults and \$3,000 for serious or critical faults. These estimates are based on typical industry experience. The four fault categories are based upon temperature differentials from the norm. Minor faults are 1 – 9° F above the norm. Intermediate faults are 10 – 34° F; serious faults are 35 – 74° F; and critical faults are 75° F or greater above the norm.

Energy savings vary by temperature differential and current (amps). Energy savings can be calculated using a FLIR created tool called “Indirect Power Calculations from Surface Temperatures” or estimated from a number of sample calculations and assumptions. The following are considered reasonable estimates – \$1.50/day for critical faults; \$0.75/day for serious; \$0.40/day for intermediate; and \$0.15/day for minor. A cost of \$0.15 per kilowatt-hour (KWH) is used to develop these estimates, but energy costs may be higher in some areas. We use 250 working days in a year (estimating 10 holidays) to estimate energy savings for each fault.

The value of an IR survey is estimated at \$2,000 based on typical experience of our thermographers. That equates to \$12,308,000 total value.

These IR surveys have saved CNA clients an estimated \$52 million or **about \$4 saved for every \$1 value of IR survey**. These savings include both reduced electrical repair costs and energy savings.

Electrical fire losses are avoided by correcting faults discovered during IR surveys. Insurance loss statistics (from 1992-2001, as published in 2002) showed that “average” electrical fire losses were about \$200,000 for circuit breakers; \$500,000 for switchgear; and \$1 million for Motor Control Center (MCC) rooms. A reasonable “average” electrical fire loss in 2010 is estimated to be \$750,000 based on inflation factors (means cost analysis data) and more recent CNA Insurance loss experience.

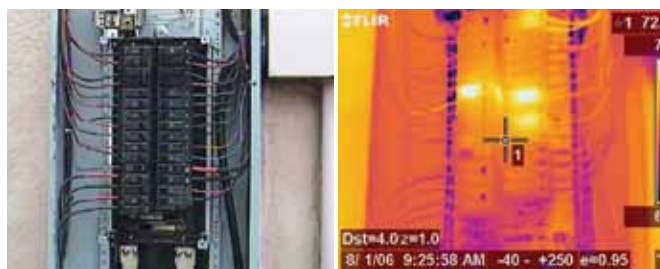
The actual chance of an electrical fire occurring is difficult to quantify. We use the average electrical loss of \$750,000 or use the specific loss by type (circuit breakers, switchgear, or MCC rooms) for critical and serious fault(s) discovered during the IR survey. We do not calculate or estimate fire losses for intermediate or minor faults. If the fault is found on specialized equipment (like a transformer), we use specific replacement cost information for the type or piece of equipment.

Business Interruption (BI) estimates are based on the percentage of operations lost for number of days (divided by 365). The basic electrical fire risk estimates (above) include both property damage and BI loss numbers. We focus on critical and serious faults only for BI estimates, but not every fault will have a BI estimate associated with it. We focus on key equipment (such as transformers or boilers) that has BI potential for plant or facility operations. A reasonable minimum BI loss estimate for critical and serious faults is one day's loss of 100 percent operations, but the BI estimates are sometimes more than one day.

### And help our customers prevent serious losses

Our thermographers have identified one or more critical or serious faults on 2,934 surveys out of the total of 6,154 surveys completed so far. If we apply the \$750,000 average electrical fire estimate, that adds up to about \$2.3 billion in electrical fire losses avoided. Adding BI estimates raises the total even higher.

Since the inception of the IR program in 2005, we estimate that clients whose equipment was scanned by our thermographers have saved more than \$13 million per year.



MADDING, ROBERT P. “Indirect Power Calculations from Surface Temperatures” tool provided by FLIR.

## Success Story

### Potential Electrical Breakdown Avoided

CNA conducted an IR test at a wood preservative manufacturer in the southern U.S. in early 2006. The facility, where we provide Equipment Breakdown coverage, had more than \$50 million total insured value, including \$20 million business interruption value. The CNA thermographer identified one critical fault among 10 total faults involving the main switchgear for the facility. If that one critical fault had caused the switchgear to fail, the facility might have lost 100 percent of its operations for up to seven days. That could have added up to \$750,000 property damage and \$500,000 in business interruption loss. The correction of the other nine faults saved the client an estimated \$50,000 in electrical repair costs, reduced electrical fire risk, and energy savings, bringing the total savings estimate to more than \$1.3 million.

## Let us help you create a safer workplace today.

Please contact your local CNA Risk Control Consultant to learn more about infrared thermography and to see if your facilities are eligible for this exclusive service.

For information on this and other Risk Control programs and services, visit the CNA Risk Control Web site at [www.cna.com/riskcontrol](http://www.cna.com/riskcontrol).

When it comes to providing the advanced diagnostic services our clients need to reduce risks ...  
**we can show you more.®**

RISK CONTROL

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