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## CNA Saves its Clients More Than \$80 Million over 3 Years of IR Surveys from March 2005 through 2008

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### ABSTRACT

Insurance companies have traditionally focused on controlling the impact of property losses by using fire protection systems to minimize the amount of a loss if it happens. But rarely do insurance companies offer a service that actually PREVENTS losses and saves its clients money. CNA is that rare company and developed an infrared thermography service to help our clients actually prevent losses from occurring. This paper is an update of a similar paper presented at the InfraMation 2006 conference in Las Vegas NV.

### INTRODUCTION

Infrared thermography officially began at CNA in March 2005 after the purchase of (8) FLIR Model P65 cameras and training 25 CNA risk control employees as Level I thermographers. The program was enhanced in November of 2005 with the purchase of (7) more FLIR Model P65 cameras and training 25 more risk control employees to Level I. Next, (8) more FLIR Model P65 cameras were purchased in 2006 and services expanded into Canada and Hawaii. FLIR (ITC) has trained more than 75 CNA risk control employees to Level I or II status by 2008. IR testing is currently offered to CNA clients with Total Insured Value (TIV) facilities of \$10 million or more.

### INFRARED METRICS (UPDATED IN 2008) TO ESTIMATE COST SAVINGS

**Electrical repair cost savings** are estimated at **\$500** for Minor or Intermediate faults and **\$3000** for Serious or **Critical** faults. These are based on typical industry experience.

**Energy savings** can be calculated directly using the FLIR generated Excel spreadsheet "Indirect Power Calculations from Surface Temperatures" or can be estimated. Energy savings vary by temperature differential and current (amps). A number of sample calculations have shown the following to be reasonable estimates - **\$1.50/day** for **Critical** faults; **\$0.75/day** for Serious; **\$0.40/day** for Intermediate; and **\$0.15/day** for Minor. We updated the cost to **\$0.15 per KWH** to develop the estimates but energy costs may be higher in some areas. We use 250 working days in a year (10 holidays) to estimate energy savings for **each** fault.

**Electrical fire risks** are reduced by correcting faults discovered during IR surveys. Insurance loss statistics over 9 years (from mid 1990's) showed "average" electrical fire losses (PD and BI included) to be \$200K for circuit breakers; \$500K For switchgear; and \$1 million for MCC rooms. A reasonable "average" electrical fire loss would be about **\$750K** (updated in 2008 using inflation factors and recent CNA loss experience). The chance of an electrical fire is estimated at 2% for **Critical** faults and 1% for Serious faults. Using (Risk = probability times consequences) the electrical fire risk can be calculated. We do not calculate or estimate fire losses for Intermediate or Minor faults.

We use the "average" electrical loss of **\$750K** or use the specific loss by type (circuit breakers, switchgear, MCC rooms) for every **Critical** and Serious fault discovered during the IR survey. If the fault is on a specialized piece of equipment (like a transformer), we use specific replacement cost information for the type or piece of equipment.

**BI estimates** are based on % of operations lost for number of days (divided by 365). The basic electrical fire risk estimates (above) include both PD and BI loss numbers. We focus on **Critical** and Serious faults only for specialized equipment. Not every fault will have a BI estimate associated with it. We focus on key equipment with BI potential for plant or facility operations. Examples are power transformers and boilers. A reasonable **minimum** BI loss estimate for **Critical** and Serious faults is 1 day loss of 100% operations.

**Cost of IR survey** is estimated at **\$2000** each. CNA does these IR surveys at no extra charge to its clients so that is a client savings of **\$2000** (or more).

**Example #1** CNA did an IR survey at a fruit processing facility. The facility had over \$20 million TIV (Total Insured Value) including \$4 million Contents and \$10 million BI (Business Interruption) value. The CNA thermographer identified 1 **Critical**, 3 Serious, and 10 Intermediate faults as a result of the survey. The **Critical** fault (Figure 1) already showed visible evidence of charred insulation (Figure 2). If that fault had become a fire (and it was very close to doing so), the facility might have lost 100% of its Contents value due to a smoky electrical fire destroying processed fruit in storage. That is an estimated \$4 million PD loss. The correction of the other 13 faults saved the client an estimated \$40,000 in electrical repair costs, reduced electrical fire risk, energy savings, and value of the IR survey, bringing the total savings estimate to over \$4 million in this case.



*Figure 1. IR image of the outside of the panel.*

The outside/face of the panel was warm to the touch (Sp1). Upon removing the cover, there was immediate odor of burning/melting material (conductor insulation) and visual indications of burning / charring on the panel face. The insulation on the conductors actually showed charring, burning, and some of the insulation had apparently melted away. Temperature of the two bottom conductors indicated a temperature of over 407.6 F in Area 1. Sp2 notes a temperature of 182.9 F at the top conductor. Extreme heat and failure of electrical components can result in a fire situation with ensuing property damage and unplanned interruption of your business operations. The plant electrician was contacted immediately to get the fault repaired due to the seriousness/criticality of the situation. A temperature differential of greater than 75F is considered a **Critical** fault and needs to be inspected and repaired immediately by a licensed electrician.



*Figure 2. Visual image of panel showing damage.*

**Example #2** CNA did an IR survey at a chemical manufacturing facility. The facility had over \$50 million TIV (Total Insured Value) including \$20 million BI (Business Interruption) value. The CNA thermographer identified 1 **Critical** fault (Figure 3), among 10 total faults, involving the main switchgear for the facility. If that fault had become a fire and destroyed the switchgear, the facility might have lost 100% of operations for 7 days. That could have been as much as \$1 million (\$500K PD and \$500K BI) loss. The correction of the other 9 faults saved the client an estimated \$20,000 in electrical repair costs, reduced electrical fire risk, energy savings, and value of the IR survey, bringing the total savings estimate to over \$1 million in this case.

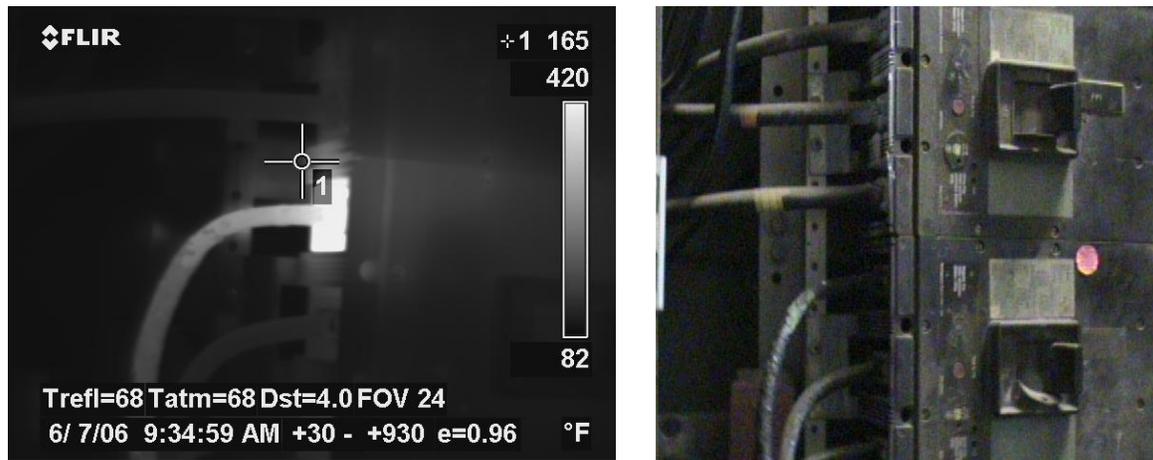


Figure 3. IR image (left) of air compressor circuit breaker A-phase lead. Visual image on right.

The surface of the connection at the A-phase lead at the Air Compressor circuit breaker at Sp1 was 420.7° F warmer than the maximum temperature of the area (Ar1). This was a **CRITICAL** fault which could be caused by loose, dirty, or corroded connections. There was a possibly damaged connection within the circuit breaker. **This fault required immediate attention.** This equipment was shut down upon finding this fault. The conductor and circuit breaker was removed and inspected. The connection was cleaned and inspected for corrosion or pitting (and possibly replacement of the circuit breaker). If no corrosion or pitting was found, reconnecting and tightening and/or re-torquing the conductor might fix the problem. The service load was verified for proper rating of circuit to ensure there are no unbalanced load conditions. All repairs and/or new installations should be conducted in accordance with NFPA 70 “NEC”. The damaged breaker was removed and a replacement installed.

## SUMMARY

Everyone knows that IR surveys save money. Our clients can easily recognize the value of an IR survey when these cost savings estimated are based on “real world” metrics updated in 2008. This has reinforced the value of the CNA IR testing program for our clients, underwriters, and insurance agency partners.

## REFERENCES

Madding, Robert P. “*Indirect Power Calculations from Surface Temperatures*” spreadsheet provided by FLIR.

## ACKNOWLEDGEMENTS

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## ABOUT THE AUTHOR

Tom is a Level II thermographer and has been using IR technology for over 3 years.

