



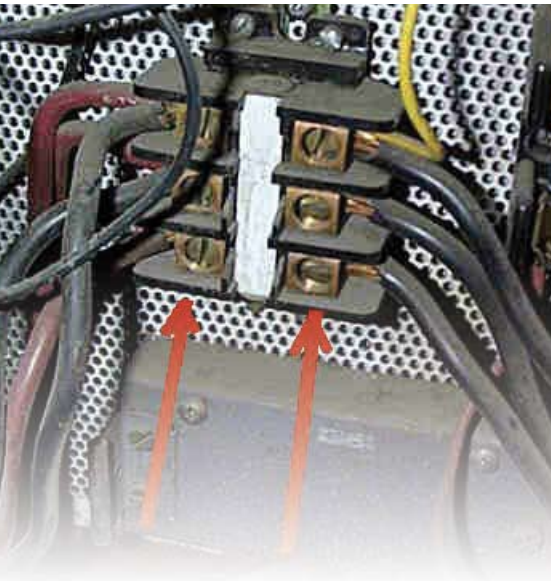
## InfraRed Thermography

### Infrared Energy

All objects warmer than “absolute zero” (-273°C) radiate energy which cannot be detected by the naked eye, but it is clearly visible in the infrared spectrum if you have the right equipment. Infrared cameras view energy (heat) in the infrared spectrum and re-modulate the image into the “visible” light range. The bright areas of the image, indicate heat - the darker areas indicate cooler sections. Today’s commercially available equipment is capable of “seeing” and measuring the temperature of objects from as cold as -20°C to as hot as 1,500°C.

### Why Chose Vibtech?

- We have been providing premium InfraRed services since 2000.
- Since we are dedicated to identifying potential faults - not repairs - our reports are totally unbiased.
- Reports are written in plain English with precise recommendations.
- All testing is non-destructive and does not interrupt production.
- Vibtech’s full time thermographers ensure the fastest response time - 24/7.



### **InfraRed Thermography - a path to more reliable in-plant electric power**

- **Increase Overall Plant Efficiency**
  - **Less Downtime as a Result of Power Failures**
  - **Lower Maintenance Costs**
  - **Reduced Electricity Costs**

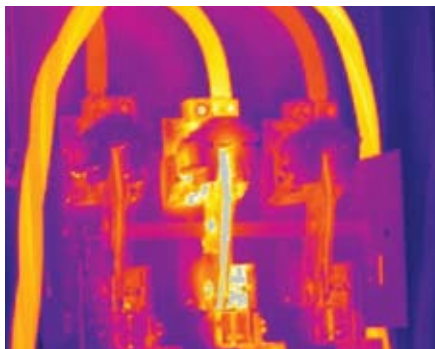
### Typical Applications

Infrared Thermography is used to troubleshoot and diagnose many different faults. It is routinely used to identify problems in the following areas:

- Transformers
- Main Feeder Panels
- Sub-Feeder Panels
- Distribution Panels
- Motors / Motor Controllers
- Bus Bars
- Lighting Panels
- Any Electrical Connection
- Steam Traps
- Oven Insulation
- Roof Insulation



*Thermal photograph showing heat loss through a roof membrane.*



Thermal photograph reveals a fault on one phase of a three phase disconnect switch.

## Predictive Maintenance

All successful Predictive Maintenance Programs have a number of critical characteristics.

- The frequency between checks must be adequate to permit failures to be predicted, thereby avoiding expensive downtime and interruptions to production.
- All measurements must be captured and stored for future reference and analysis.
- There must be some method of trending data.
- Reporting must meet management's needs, be specific about problems, and clearly indicate corrective work required.

- Thermal images are recorded on all points regardless of whether or not faults are found. These images are stored as reference.
- Priority levels are set for every anomaly.
- All data is entered into a Trend Report which lists all equipment checked, its condition and the priority levels assigned to each.
- Follow-up surveys are scheduled two to three months after each complete plant survey. Previously noted anomalies are re-checked to ensure that corrective work has solved the problem.
- A variety of reports are offered to ensure that information is provided in a timely and useful format.

Vibtech offers the only truly "predictive" Infrared program:

- Full plant wide checks are done twice a year to identify problems before they result in catastrophic failures.

**Predictive Infrared Analysis**

Unit Designation: Air Compressor 21 R.P. Date: March 15, 2004

**Highlights Data**

Manufacturer: Siemens Model: 80M2  
 S/N: Not Available Full Load/Empty Tank Available  
 Voltage: 480V (1 Phase) Capacity: 60 Amps  
 From: RT300M Frequency: 60 Hz

**Electrical Data**

Current Draw at the time of inspection:

Left	Center	Right
28	28	28

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**DESCRIPTION** DATE

Fuses Nov. 21, 2003

Identification: CV 087, Section A-70

**INFRARED IMAGE** **PHOTO**

All connections: Fuses Current: Electrical at Time of Inspection  
 Size of Sample: 1.5 (10) Test Available  
 Major parameter: 0.00  
 Ambient temperature: 22.2°C  
 Emissivity: 0.90  
 Distance: 30.2 (10)

**DESCRIPTION:**

No infrared image of fuses located inside the CV 087 panel identified as the main fuses. Reading was noted on the top outside full loadly connections and cover in place. No IR connection could show for equipment temperature inside any fuse. An electrical safety report was received at the time of the inspection.

Priority: CV 087, Section A-70

**RECOMMENDATION:** [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]  
 No Action Taken High Start Rate

If there are connection components for test storage: Report if required  
 Check the fuse and fuse clips. Review the fuse clip tightness as per the manufacturer's specifications.  
 Documented the test after the inspection is completed.

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**Priority Trending Report**

Bank	Section	Unit Designation	April 03	June 03	Oct 03	Nov 03	Dec 03	Jan 04
A	01	CV001						
A	02	CV002						
A	03	CV003						
A	04	CV004						
A	05	CV005						
A	06	CV006						
A	07	CV007						
A	08	CV008						
A	09	CV009						
A	10	CV010						
A	11	CV011						
A	12	CV012						
A	13	CV013						
A	14	CV014						
A	15	CV015						
A	16	CV016						
A	17	CV017						
A	18	CV018						
A	19	CV019						
A	20	CV020						
A	21	CV021						
A	22	CV022						
A	23	CV023						
A	24	CV024						
A	25	CV025						
A	26	CV026						
A	27	CV027						
A	28	CV028						
A	29	CV029						
A	30	CV030						
A	31	CV031						
A	32	CV032						
A	33	CV033						
A	34	CV034						
A	35	CV035						
A	36	CV036						
A	37	CV037						
A	38	CV038						
A	39	CV039						
A	40	CV040						
A	41	CV041						
A	42	CV042						
A	43	CV043						
A	44	CV044						
A	45	CV045						
A	46	CV046						
A	47	CV047						
A	48	CV048						
A	49	CV049						
A	50	CV050						
A	51	CV051						
A	52	CV052						
A	53	CV053						
A	54	CV054						
A	55	CV055						
A	56	CV056						
A	57	CV057						
A	58	CV058						
A	59	CV059						
A	60	CV060						

Note: Machines with no priority noted have been checked and have a priority of "0".  
 Machines not checked have "N/C" indicated and the priority box lightly shaded.  
 Priority shaded areas indicate machines not on follow-up list to be checked.

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