CONGRESO DE MANTENIMIENTO & CONFIABILIDAD

MÉXICO

ORGANIZADO POR:

AMGA

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How to set up a Successful Sustainable Mechanical Inspection Program using Infrared Thermography

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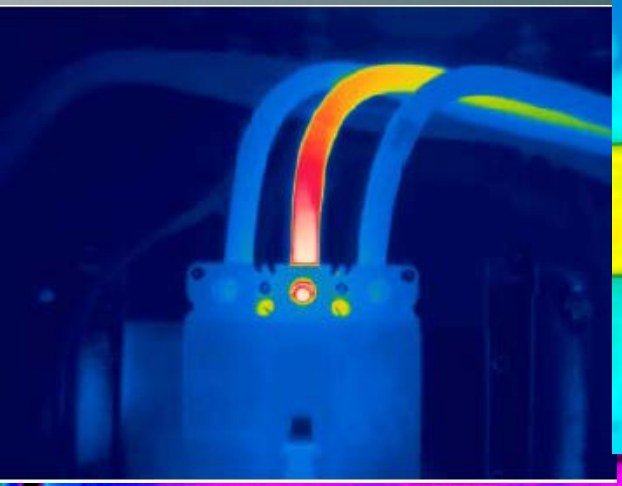
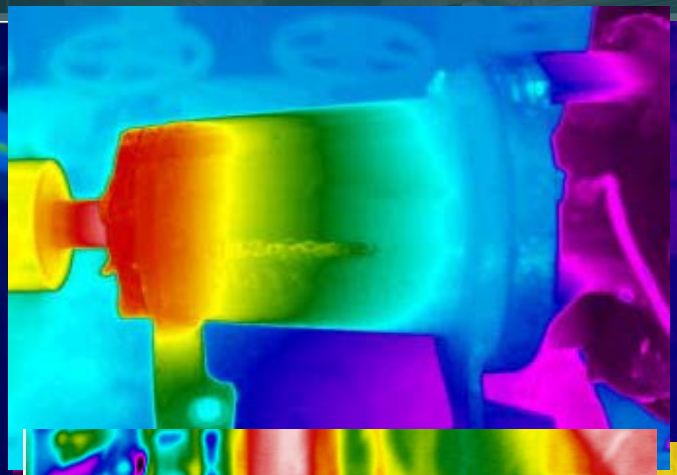
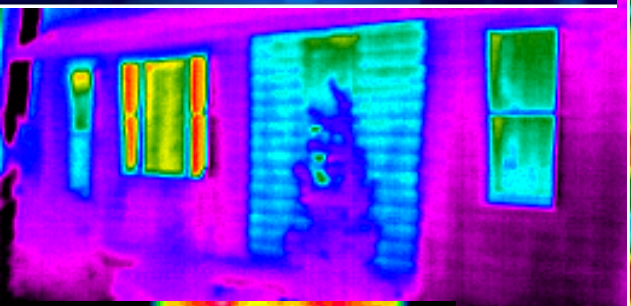
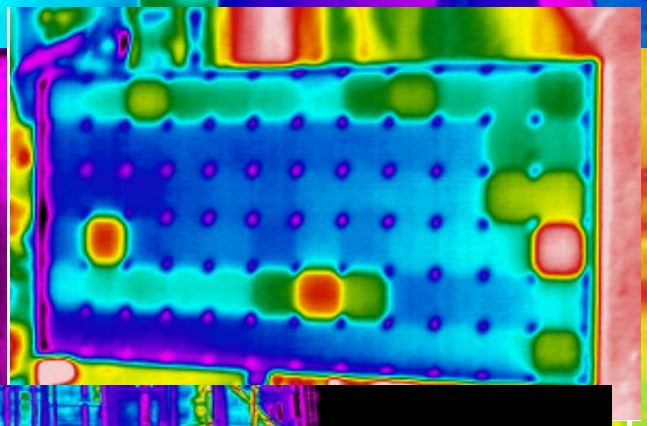
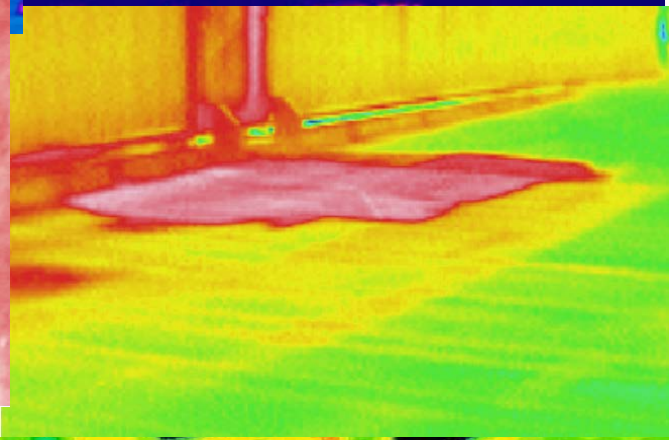
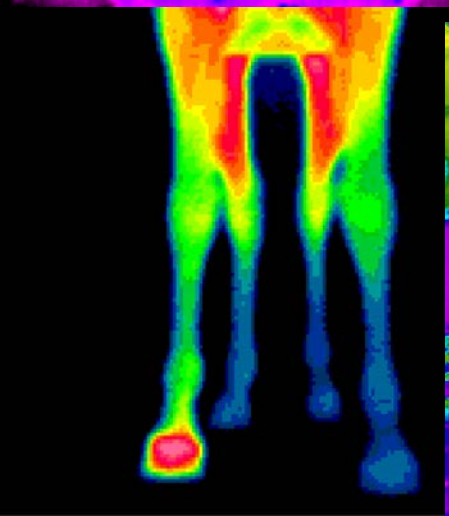


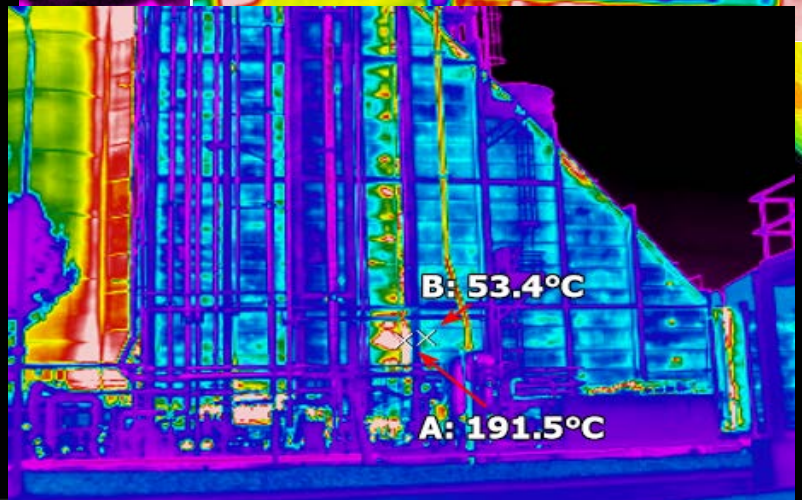


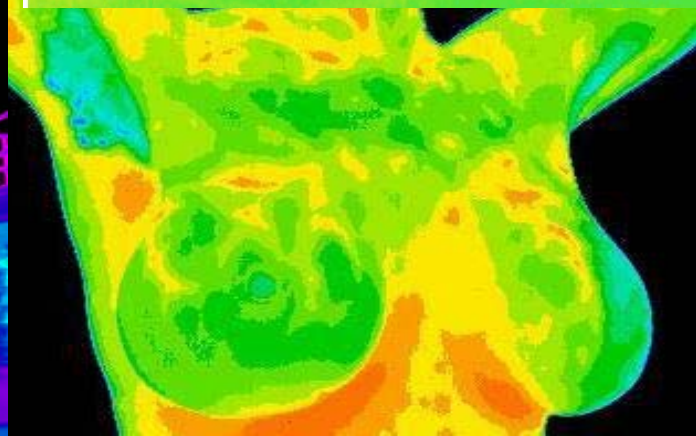









B: 53.4°C
A: 191.5°C



The First Law of Infrared Thermography

Infrared Instruments "See" Infrared Radiation From the 1st 1/1000 Of An Inch of The Surface Of Most Solids and Liquids.

Therefore:

They Do Not Measure or See Temperature!!!

They do not "see through" most solids or

IR Electrical Inspections: NFPA 70B

Electrical Maintenance Standard

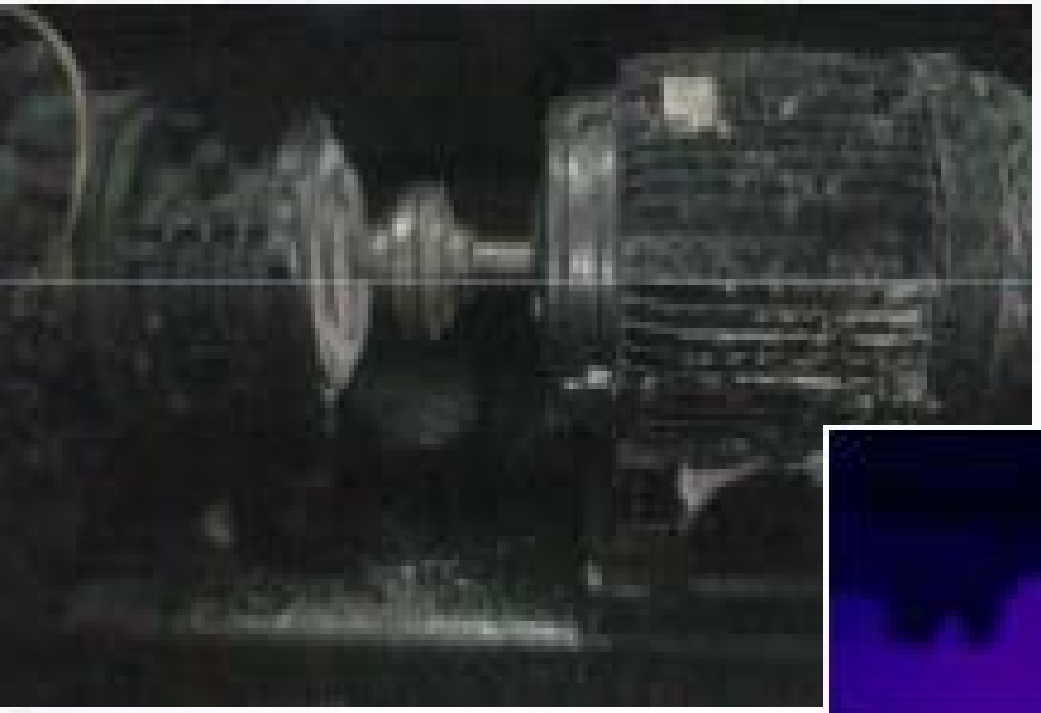
Specifically recommends the use of infrared thermography to inspect **all** electrical power distribution equipment **at least annually. More frequent** infrared inspections, for example, quarterly or semiannually, should be performed where warranted by loss experience, installation of new electrical equipment, or changes in environmental, operational, or load conditions."

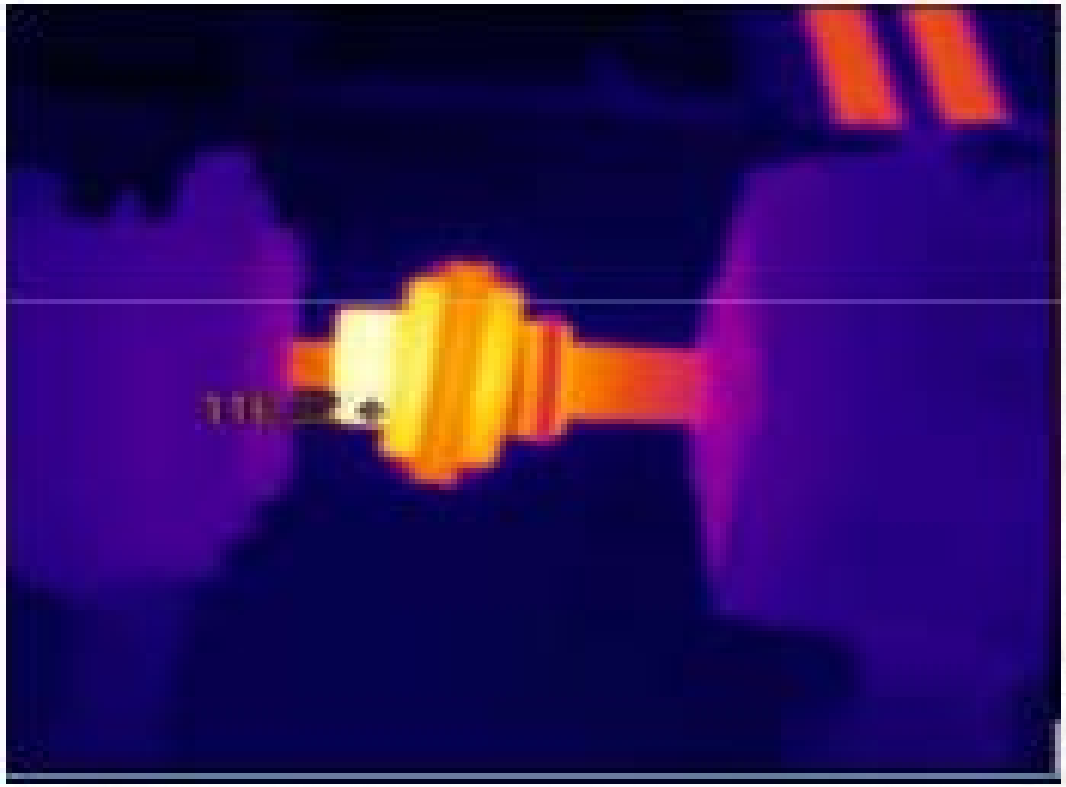
Mechanical Inspections

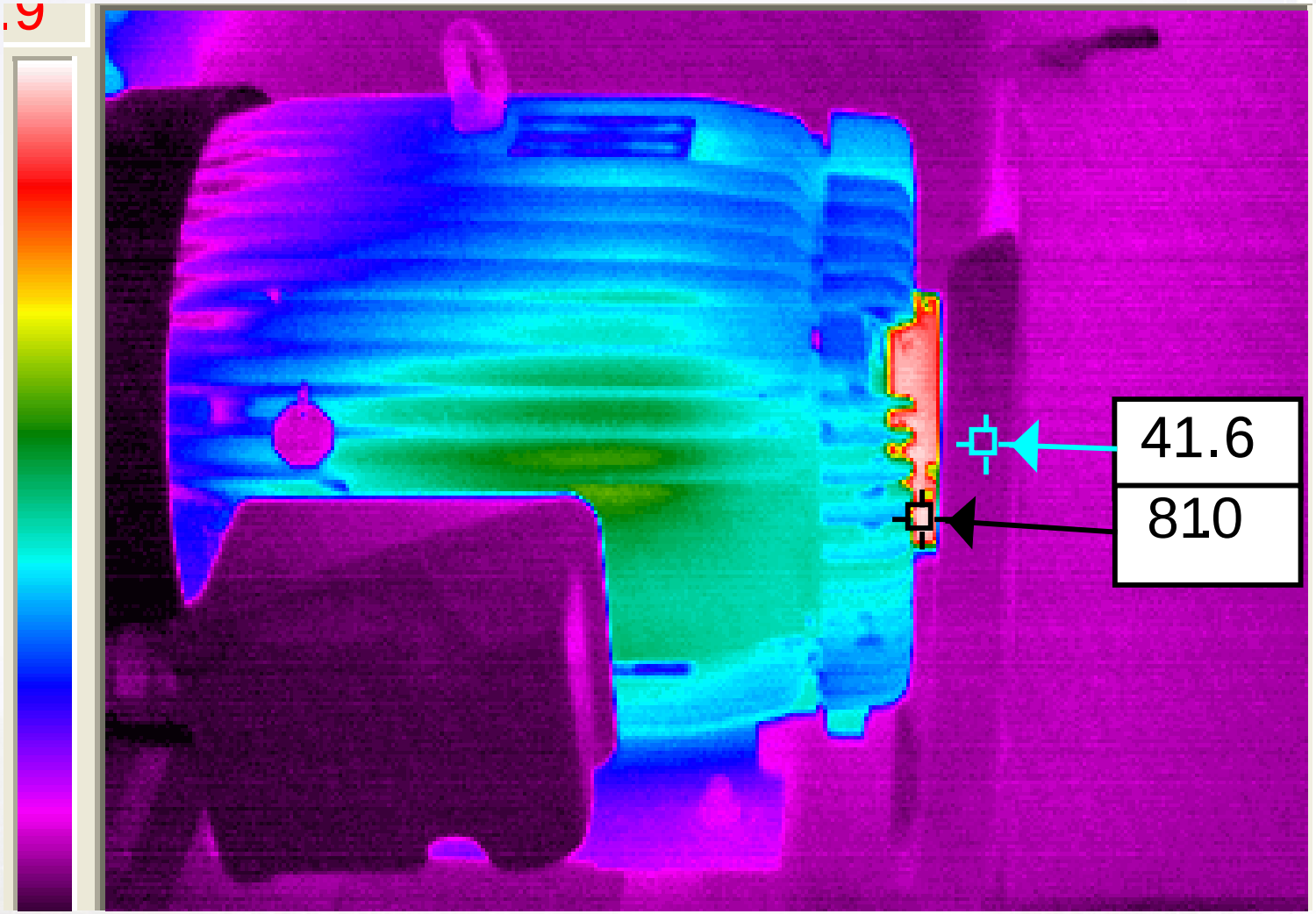
- Vibration Analysis
- Oil Analysis
- Motor Circuit Testing
- Ultrasound

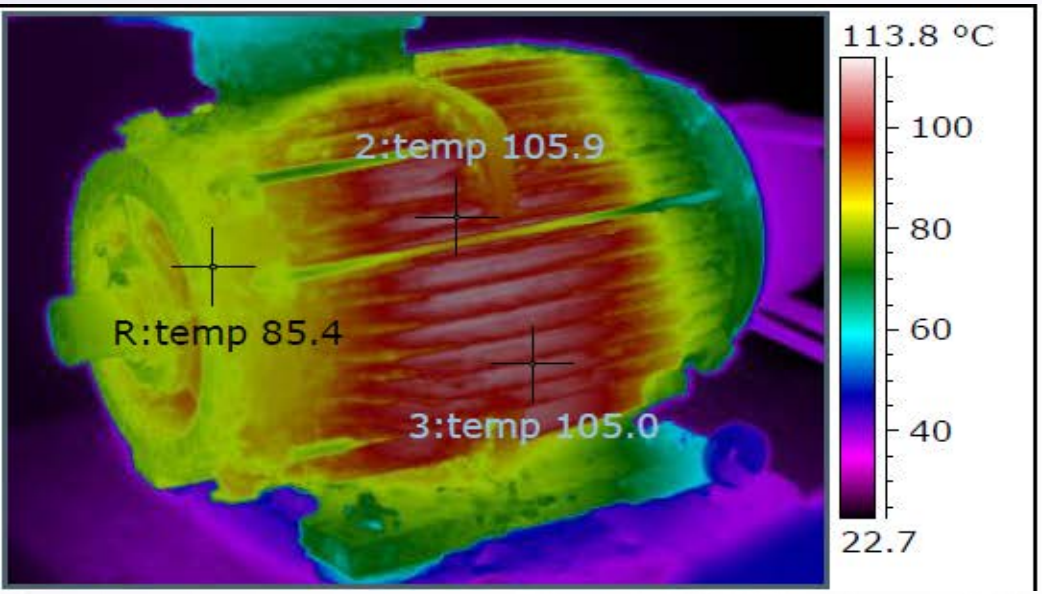
Most mechanical equipment is composed of some form of moving parts. In a perfect system all of the energy supplied to the machinery should result in profitable work done by the equipment. In reality a certain amount of energy is transformed by friction or stress into thermal energy, As mechanical equipment begins to fail or operate in an undesirable fashion, there will usually be a change in the normal thermal pattern of the equipment as compared to the thermal pattern of a properly operating system. Infrared Thermography is the most proficient tool to identify failing mechanical equipment before it can cause catastrophic failure, and a loss of production

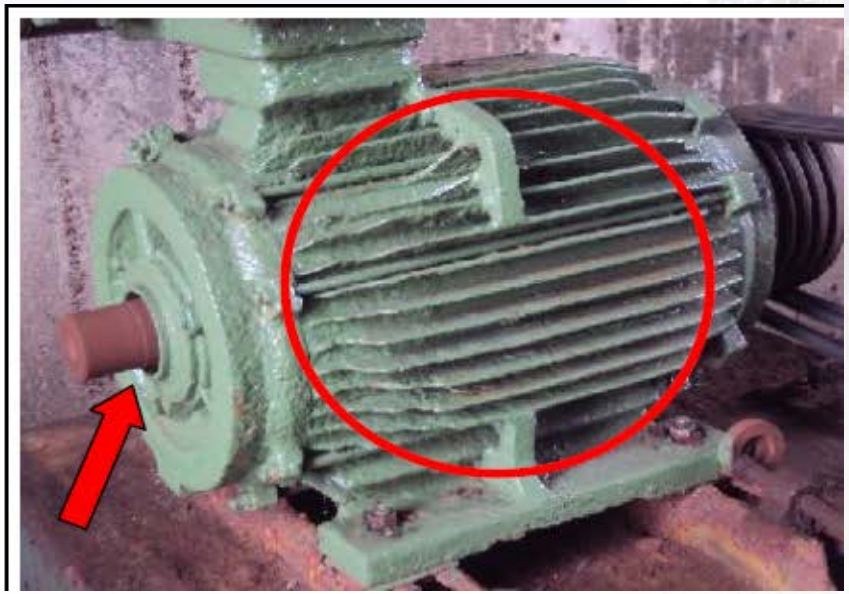

65.85



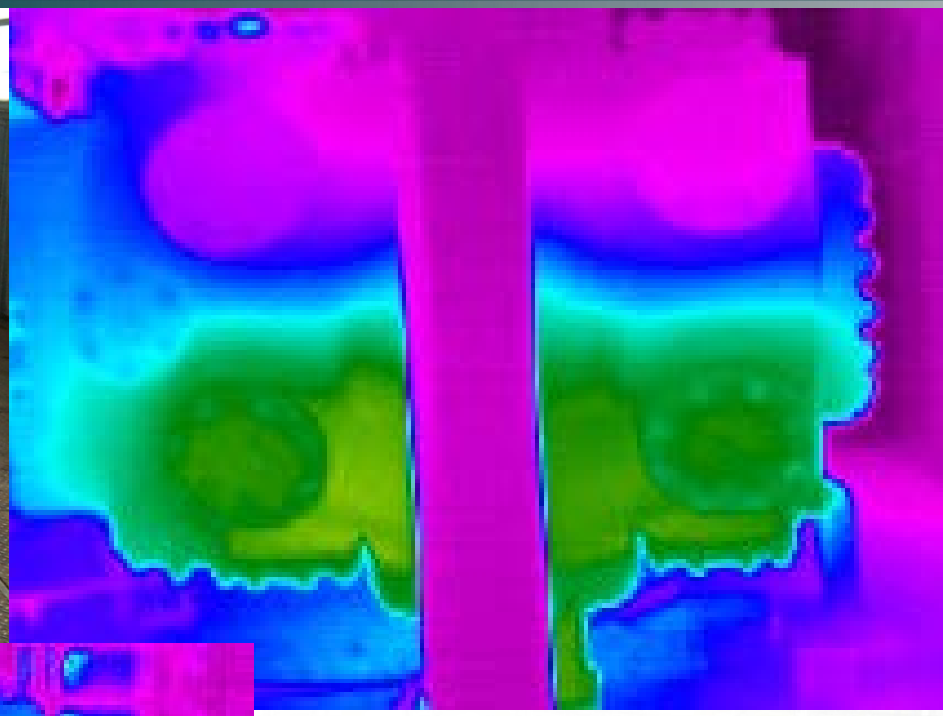


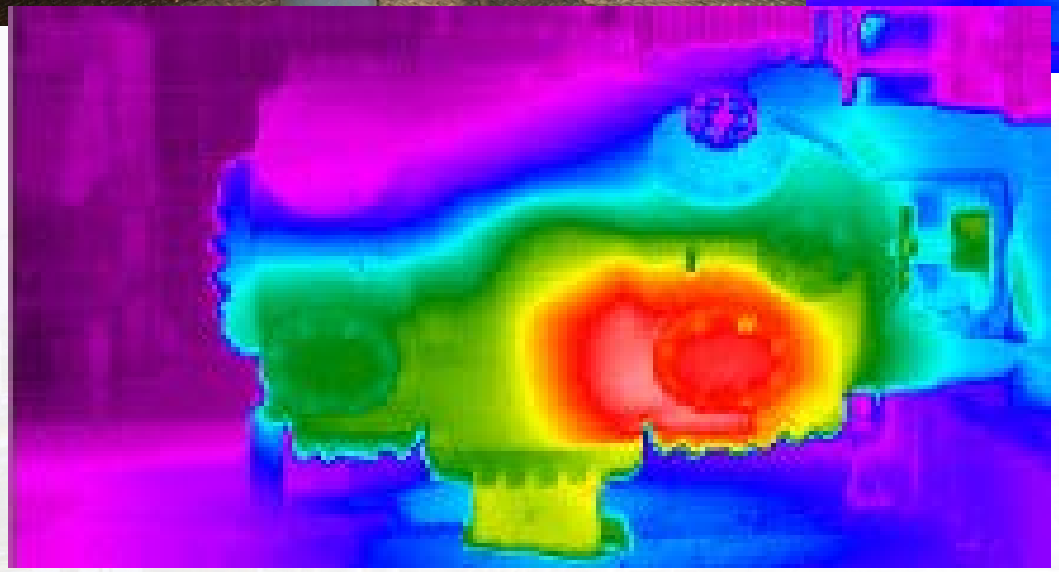

41.6
810





Calculated Maximum allowable surface winding area 70^{O}C. Motor operating at least 35^{O}C above allowable. Motor life diminished from 20 years to less than 2 years.





Infrared Thermography is the most efficient, and cost effective, monitoring tool for the monitoring of most mechanical equipment.

It is the best mass screening tool for:

Motors Pumps Bearings

Conveyors Fans Pulleys

Gear Boxes Compressors

Robotic Equipment

Paper machines, Rotary lime kilns

Infrared Thermography is Not Point and Shoot and a Successful IR mechanical program is not walking around the facility and looking at all your mechanical equipment.

10 Steps to Setting up a Successful Sustainable Infrared Mechanical PdM Program

1. Get Proper Training (Knowledge of the technology)
2. Audit your facility for applications, program scope, costs & support requirements, set goals, benchmarks and targets.
3. Purchase suitable camera/software to meet application and program needs.

**(Repeat step 1 for proposed staff for program)*

4. Create written procedures (inspections, safety, reporting, re-inspections)
5. Create database: include equipment, routes, frequencies, cost avoidance, repairs undertaken

6. Initiate program – perform baseline inspections
7. Adjust program to fit reality discovered during baseline activities.
8. Review goals KPIs ROIs, readjust as necessary
9. Communicate results
10. Re-evaluate program on a set time frame. (Continuous Improvement)

1. Training (Knowledge) ISO 18436-7

a. Understand the fundamental principles of Infrared Thermography.
b. Understand the limitations, technology, cameras. Emissivity, Temp. Ranges, IFOV, IMFOV
c. Be aware of the various applications possible with this technology, Electrical, Process, Facility
d. Qualitative & Quantitative principles

2. Audit Your facility:equipment to be Included in your program (ISO13379), Camera specifications

a. Analyse the equipment or system, looking at it's specifications and performance standards, compared to the expected outcome.

b. List the major components and their functions.

c. List the failure modes, their causes and their symptoms.

d. Determine which symptoms are diagnosable with infrared thermography

e. Produce a camera specification matrix, FOV IFOV, IMFOV, Temperatures, etc.

f. Determine the monitoring priority number for inspections (ISO 13379)

g. Analyse equipment downtime/lost production costs etc. and IR program return on investment (ROI)

h. Prepare written proposal for management approval and support, include program requirements, and all costs verses return on investment, (production, safety, and compliance).

3. Camera Selection:

Wavelength:
Temperature Range:
Accuracy:
FOV:
IFOV:
IMFOV:
Batteries
Warranty
Service & Support

Manual Controls:

- ***Focus***
- ***Level***
- ***Span***
- ***Emissivity***
- ***Background***

Data Storage
Software

4. Written Procedures:

a. Qualitative thermography
b. Quantitative thermography
   emissivity calculation
   background calculation
c. Inspection procedures
d. Camera care procedures
e. Reporting procedures
f. Re-inspection procedures

5. Create database:

a. Equipment name
b. Manufacturer
c. Equipment number
d. Location
e. Route number, route placement number
f. Inspection date
g. Operating condition
h. Result of inspection
i. Fault classification/identification
j. Severity of fault found
k. Repair classification
l. Success of repair

6. Initiate program – perform baseline inspections
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¡GRACIAS!

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Nombre del conferencista

Insertar puesto actual

SI TIENES PREGUNTAS O COMENTARIOS…

¡No dudes en acercarte!