



<p style="text-align: center;"><b>DISTANCE LEARNING INFRARED INSPECTION OF PETROCHEMICAL FACILITIES</b></p>
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### **1. Basic Infrared Theory**

- Heat transfer
- Electromagnetic spectrum
- Emittance, reflectance, and transmittance
- Atmospheric transmission
- IR imaging systems and lens materials

### **2. Infrared Equipment**

- Selection criteria
- Range and level settings
- Equipment set-up & operation
- Image interpretation & recording
- Equipment care & maintenance

### **3. Infrared Electrical System Inspections**

- Theory and thermal signatures of problems
- Seven types of detectable defects
- Conducting an inspection
- Safety practices
- Confirming exceptions
- Data recording
- Standards for inspections

### **4. Infrared Mechanical System Inspections**

- Theory and thermal signatures of problems
- Rotating equipment
- Power transmission components
- High-temperature insulation
- Steam systems, process equipment, heat exchangers, storage vessels
- Active thermographic inspection techniques
- Safety practices
- Confirming exceptions
- Data recording
- Standards for inspections

## **5. Structural Energy Loss Inspections**

- Theory and component construction
- Insulation & material characteristics
- Inspection techniques
  - interior / exterior
- Weather variables and models
- Required site conditions
  - creating sufficient delta-T
- Pre-inspection procedures
- Inspection and data recording
- Verification of data
- Conduction losses by insufficient, missing, damaged or improperly-installed insulation:
  - weather variables and influences
  - thermal signatures
- Convection losses by uncontrolled air movement
  - natural and forced convection
  - thermal signatures
  - pressurization/depressurization techniques
- Standards for inspection
  - end user and thermographer responsibilities
  - safety practices
  - data gathering and report preparation
- Infrared inspections of boilers and heater tubes

## **6. Implementing an IR Predictive Maintenance Program**

- 9 steps to setting up a program
- Integrating with other predictive technologies
- Cross-verifying with other predictive technologies
- Why programs fail, how they succeed
- Generating standards compliant reports