Methods of Physical Plant Predictive Maintenance

Regularly inspecting equipment serves many important purposes. Among them, it:

- Helps owners or users determine the current condition of the equipment and also allows comparison of results with previous inspections.
- Helps spot trends and predict life cycles.
- Can uncover defects and deficiencies that must be corrected before a catastrophic breakdown occurs.

Introduction

Equipment must be inspected and tested at a frequency that is recommended by the manufacturer or mandated by an authority having jurisdiction. After equipment has been accepted and placed in service, it should only be tested within its designed parameters to prevent damage - except when required by the manufacturer or an authority having jurisdiction.

Common Inspection Methods

Four commonly used methods of inspection are visual, ultrasonic, eddy current and thermographic. A visual inspection should be performed in conjunction with any other type of inspection. These four methods are considered Non-Destructive Examination (NDE) or Non-Destructive Testing (NDT). Meaningful results can only be achieved when the equipment and instruments used are suitable for the material being tested and when the inspectors are trained and qualified in the procedures used.

Visual Inspection

Visual inspection includes looking at the equipment that is in direct view. Equipment that is not in direct view can be inspected by using mirrors, cameras, optical flexible tubing or some other device. Visual inspection can only determine the surface condition of the object and surrounding area. Conditions to be considered:

- Review documentation of previous inspections and maintenance records
- General housekeeping and location of equipment: There may be codes that require a specific amount of clean and open space around boilers, electrical panels and other equipment
- Accessibility: Are ladders, walkways, means of egress, ventilation and proper lighting provided?
- Surface conditions:
  - Rust
  - Scale
  - Corrosion
  - Burn marks

Methods of Physical Plant Predictive Maintenance

  - Dents, scrapes, indentations, bulges
  - Signs of overheating
- Leaks
- Missing covers and open access doors used to enclose components

Ultrasonic Inspection

Ultrasonic inspection measures the thickness and detects flaws on different types of materials, including metals, ceramics, plastics, glass and rubber. Ultrasonic testing can be accomplished in a relatively short period of time and is used extensively to measure the wall thickness of pipe, tubing and other pressure-retaining parts. High frequency and highly directional sound waves pass through and bounce back to the instrument that monitors, records and analyzes the wave patterns to document the test results.

Eddy Current

Eddy current testing locates surface cracks, near-surface cracks, and pitting and corrosion on inner surfaces. It can determine metal thickness by measuring the change in an induced magnetic field caused by discontinuities of the material being tested. The eddy current test is most commonly used to inspect heat exchanger tubing on air conditioning and refrigeration chiller systems for thickness, cracks and corrosion. The magnetic field is created by a device that is pushed inside the tube. The instrument monitors and processes the intensity of the magnetic field as the probe is pushed through the full length of the tube to display and record the test results.

Thermography

Thermography is performed using a camera that detects the intensity of infrared. It processes this information to create an image of the object in different colors that represents a temperature scale. The outer surface of the equipment is scanned at a distance and there is no contact with the object being tested.

Typical equipment that is surveyed includes electrical switchgear and panels, transformers, cable and bus, motors, bearings and insulation. Care must be taken during these surveys because electrical panels must open and guards around rotating equipment must be removed for access to take the picture.

A thermographic survey should be performed with the equipment operating at normal or full capacity. This test should be performed prior to a scheduled shutdown so that problems can be corrected without disrupting normal operations

Closing Comments

With regularly scheduled inspections, you can help ensure awareness of the equipment’s condition, so that maintenance and replacement can be planned without interrupting the normal operation of your business.

To learn more, visit BoilerRe.com.

Travelers BOILERRe℠