

Thermal Imaging Circuit Rider

COMPANY BACKGROUND



The Iowa Department of Natural Resources (DNR) has offered technical assistance to Iowa companies since 2001 through its Pollution Prevention Intern Program. This program places qualified student interns with Iowa companies for 12 weeks to identify, research, and implement changes that result in environmental and financial savings. In addition, the Iowa DNR's Pollution Prevention Services maintains a staff of engineers and environmental specialists who regularly conduct assessments for facilities. The goal is to identify changes improve the company's economic and environmental performance. All of these services are confidential, non-regulatory, and free to Iowa industry.

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PROJECT BACKGROUND

The 2009 thermal imaging circuit rider internship was hosted by the Pollution Prevention Intern Program in partnership with a grant from the US Environmental Protection Agency. The grant funding provided cost share for the purchase of an infrared camera to be used to identify radiant energy loss and make recommendations for modifications that will improve efficiency. Traveling and doing thermal imaging and analysis of facilities throughout Iowa and Nebraska, the intern identified a multitude of areas for improvements at the companies visited.

INCENTIVES TO CHANGE

In today's unstable economy many companies are looking at all possible ways to save money. Add to that the possibility of sky-rocketing energy prices and energy-saving projects become all the more important. This pilot project will help establish parameters to integrate thermal imaging into the technical assistance offered by Pollution Prevention Services.

The intern used the infrared camera to identify areas of energy loss. Locating these sources and recommending corrective actions will assist companies in decreasing their equipment downtime and energy costs. In addition to reducing energy consumption companies will improve environmental performance. The intern also demonstrated ways to use thermal imaging in predictive and preventative maintenance procedures.

RESULTS

Electrical Panels: Inspecting electrical panels can lead to multiple benefits for a company. The intern identified loose, dirty, and corroded connections. These types of poor connections often have high resistance associated with them leading to the high temperature. Fuses and breakers were also examined because as they begin to fail, their temperature will increase. Another area evaluated was three phase wiring. Unbalanced three phase wiring will lead to higher electrical costs and can also be an early warning of equipment failure elsewhere in the line. A failure in any of these areas can cause a costly shutdown of production until the problem can be fixed.

Building Shells: The intern used thermal imaging to identify areas of poor insulation by looking for any anomalies during a scan of a building shell. Areas of no insulation along with areas of wet insulation can be identified when there is a contrast in the ambient conditions. A high contrast between the inside and outside temperatures makes identification easier. Fixing problems in a building shell can create a more comfortable environment to work in for employees and also reduce the amount of energy used to maintain a certain environment.

Motors and Shafts: Using the infrared camera, the intern identified motors that could be a source of high energy usage. A motor that is not operating at its optimum efficiency uses more electricity and will often produce more heat than one operating efficiently. Every 10°C a motor is running over its specified operating temperature cuts the life expectancy in half. When a company has many motors operating at reduced efficiencies, a large amount of electricity is wasted along with the additional load of having to cool the air beyond what would typically be needed. Worn shaft bearings were also identified as a source of energy waste. Failing bearings produce more heat and require more power to turn the shaft at the same speed. Keeping the motors and shafts working smoothly will save energy and reduce unexpected failure of equipment.

Door Seals: In facilities that have large areas of cold storage or walk-in freezers, poorly performing door seals can often go overlooked. The intern used the infrared camera to identify doors that have leaky seals. The thermal images were a visual representation of the condition of the door seals. The intern made recommendations for replacing old, cracked, or leaky door seals to keep air from leaking around the door and to reduce the amount of energy needed to maintain specified temperatures.

Boilers and Steam Lines: The intern used the camera to identify opportunities to reduce energy loss in boilers, steam lines, and condensate returns lines. Adding or replacing insulation can produce large energy savings. Added insulation will reduce the energy required to heat the fluid to the desired temperature, and will also reduce the energy needed to cool the area where the excess heat escapes. Insulation can typically reduce energy losses so substantially that any surface over 120°F should be insulated. Insulating these hot surfaces also provides employee safety and comfort when working around these surfaces.

