HAZARD CONTROL TECHNOLOGIES, INC.

FIRE, VAPOR, AND CONTAMINATION CONTROL SOLUTIONS

HAZARD ALERT

Using Thermal Imaging to Detect Problems in Coal Handling Systems

Following are examples of the value of making Thermal Imaging Cameras part of the daily inspection of the coal handling system. Often, developing issues are not apparent to the human eye, but are visible in the infrared spectrum. Whether it is detecting a coal hot spot in the early stages of combustion or predicting a bearing failure so maintenance can be scheduled, avoiding a stoppage, the thermal imaging camera can be a very effective tool.

Detecting Coal Silo/Bunker Hot Spots

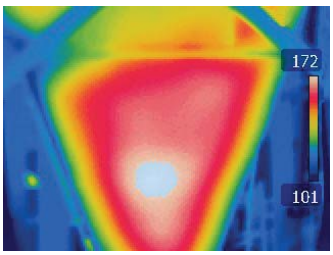
Hot spots can be discovered by CO monitors, an alert employee or a routine inspection with a Thermal Imaging Camera. The earlier the anomaly is detected, the better.

Of the many places in the coal handling system where coal inconveniently ignites, silos and bunkers are among the most dangerous because they provide a "confined space," a key component of the combustible dust explosion pentagon. When undetected hot spots begin consuming surrounding material, a void is created, surrounded by a hardened crust. This expanding crust will eventually collapse, causing a rapid shift in material, shaking the structure and dispersing a dust cloud. All of the elements now exist for a combustible dust explosion.

Properly trained personnel and local firefighters can effectively fight these hot spots, but they must first determine what stage the hot spot has progressed to, its size and location using a Thermal Imaging Camera. After a proper wash down to remove explosive coal dust in the silo and tripper room, a piercing rod operation using F-500 Encapsulator Agent can begin. A separate team with a Thermal Imaging Camera can direct the insertion of the rod to the hot spot and monitor the progress as the F-500 Encapsulator Agent is injected.

Below are images taken by an HCT Thermal Imaging Camera of a coal silo taper hot spot and an image of the outside of the vessel taper. Sometimes, the heat build-up is apparent to the naked eye, but here, without a thermal imaging camera, the heat build-up is not apparent.

Thermal Imaging Camera Photo



Digital Camera Photo As Seen By the Human Eye

Detecting Clinkers and Stagnant Coal

Coal clinkers*, hang-ups and stagnant coal in an inactive bunker or silo can lead to spontaneous combustion and hot spots if not removed prior to a plant outage.

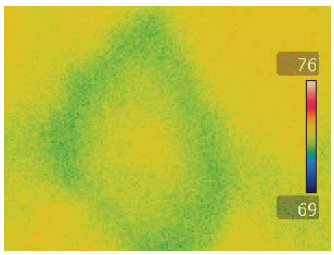
Thermal Imaging Camera

These clinkers are not detected by the plant's monitoring equipment and require a visual inspection to ensure all stagnant, hung-up material has been removed. Thermal Imaging Cameras can aid in this inspection and help detect spontaneous combustion issues prior to refilling the bunker or silo.

Failure to address these issues can have devastating results when loading material. An undetected smoldering clinker can ignite the dust generated during loading, leading to a flash fire and possible explosion.

* A silo/bunker coal clinker is a deposit of stagnant material on the structure's wall, due to poor design and the moisture content of the coal. Coals with higher moisture content, such as bituminous and sub-bituminous coals, are more prone to the formation of clinkers, so proper measures must be taken to detect and remove these hidden hazards before they become an ignition source.

Thermal Imaging Camera Photo

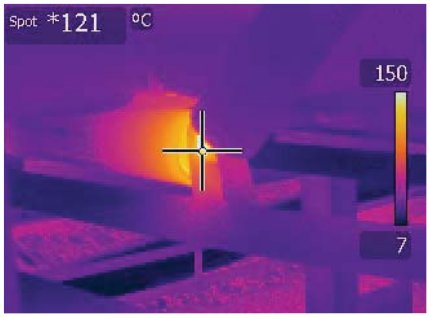


Digital Camera Photo As Seen By the Human Eye

Using Thermal Imaging to Detect Frictional Heat on Conveying Systems

Frictional heat from belt alignment, hot bearings or seized idlers can ignite the belt, accumulations of combustible materials, as well as grease and oil. A conveyor belt fire is a significant risk. A rapidly progressing conveyor fire will result in lost productivity, repair or replacement costs and jeopardize the health and safety of plant personnel and first responders. Thus, system maintenance is of the utmost importance. Inspection, lubrication, housekeeping and replacement of stalled, seized or damaged rollers should always be a priority and part of a facility's ignition control program. Periodic walk-downs with Thermal Imaging Cameras can aid in detecting potential issues before they serve as an ignition source. Repairs can be scheduled during a convenient shut-down as opposed to an unscheduled stoppage.

Thermal Imaging Camera Photo



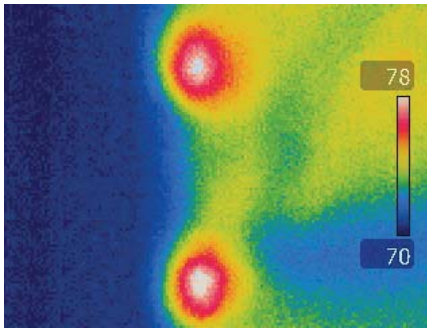
Digital Camera Photo As Seen By the Human Eye

Using Thermal Imaging to Detect Air Leaks Caused by Air Cannons

Air cannons should no longer be used as a means to dislodge stagnant coal. Although many facilities no longer utilize air cannons, they may still be in place and operational. Air cannons may leak fresh air into a coal bunker or silo, which can result in localized heating. The rate of oxidation doubles for every 18 degrees in increased temperature. This can eventually lead to spontaneous combustion issues, especially with stagnant coal, regardless of the coal's rank. When a bunker or silo is inactive, air cannons should be disconnected, removed and sealed to prevent spontaneous combustion issues. If removal is not practical, removing a section of the air supply and sealing the opening may be acceptable.

Any air entering the bunker or silo can cause oxidation problems. Air can enter an inactive bunker or silo through the discharge near the coal gate. A beach ball can be inserted near the coal gate as a temporary seal.

Thermal Imaging Camera Photo



Digital Camera Photo As Seen By the Human Eye

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