



## FLIR cameras enable timely detection and localization of self-combusting coals.

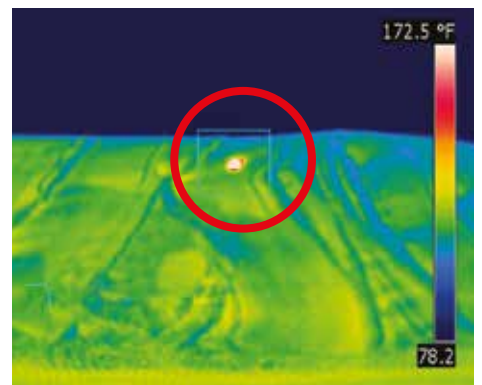
Robust FLIR A310f and E6 cameras are ideal for 24/7 temperature monitoring of coal temperatures.

*When you are storing or loading large amounts of coals, then self-combustion is always a genuine risk to be reckoned with. Dutch bulk terminal company OBA is dealing with this risk every day. In order to ensure the safety of its coal plant as well as to safeguard its investment, the company is using thermal imaging cameras from FLIR to monitor coal temperatures and detect possible self-combustion in time.*

OBA is one of the leading dry bulk terminal companies in the ARA region (Amsterdam, Rotterdam, Antwerp). The company operates from two terminals in the port of Amsterdam and is transloading several commodities, including coal, agricultural bulk goods, minerals and biomass goods. With excellent rail- and waterway connections via the North Sea and the Dutch hinterland, OBA offers connections with various logistic modalities, including seagoing vessels, push barges trains and trucks.

When you drive up to the OBA plant along the western Amsterdam port area, the massive piles of coal offer an impressive view. The storage and handling of coal amounts to some 80 percent of OBA's business, with continuous coal shipments to Germany, the Northeast of France, the UK and the Netherlands, day and night. For OBA, coal is a very valuable good that needs to be protected 24/7. The main reason for this high alertness, is self-combustion. Spontaneous combustion of coal is a common concern for coal stockyards. Coal can ignite spontaneously when exposed to oxygen which causes it to react and heat

*The FLIR A310f is a highly sensitive and high-speed camera in an environmental housing.*



*Spontaneous combustion of coal is a common concern for coal stockyards.*



# APPLICATION STORY



OBA operates from two terminals in the port of Amsterdam and is transloading several commodities, including coal, agricultural bulk goods, minerals and biomass goods.

up when there is insufficient ventilation for cooling.

For some coal types, it is not as much a question whether or not self-combustion will happen, it's a matter of when it will happen. "Self-combustion of coal is something we have to take into account every day," says Dick Meijer, Planner at OBA. "To prevent combustion from happening, we need to take the appropriate measures. More specifically, we send out an excavator or wheel loader to dig out and spread the suspected area. We have dedicated combustion fighting equipment that allows us to compact the area and to release the oxygen out of the coal stack."

## High responsiveness

Needless to say that for OBA, reaction speed is of utmost importance. Not only will coal combustion amount to high costs resulting from energy and quantity loss, but spontaneous combustion of coal can also have safety and environmental implications.

"In order to minimize those costs as much as possible, we were looking for a way to monitor the temperature of our coal stock before it is loaded onto the barges," comments Dick Meijer. "Thermal imaging turned out to be the perfect technology to do that. We already conduct weekly inspections via an external agency, but in

2013, we also invested in our own thermal imaging cameras from FLIR Systems to be sure that all coal that is leaving our plant has a temperature that is safe to be transported. The big advantage of thermal imaging compared to other technologies that we investigated, is that thermal imaging cameras can monitor entire areas of the coal stack, not just single points in the stack. When the coals are on the conveyor belt, the thermal imaging cameras allow us to see the temperatures

of the entire coal mass, not just of the coal surface. Thanks to these thermal imaging cameras, we can see in time if something goes wrong and immediately take the appropriate measures."

## Temperature monitoring certificate

Certain European countries also impose additional requirements for the transportation of coal. In a multilateral agreement between the Netherlands and Germany for example, it is mandatory that



To prevent combustion from happening, excavators or wheel loader machinery need to dig out and spread the suspected coal area.





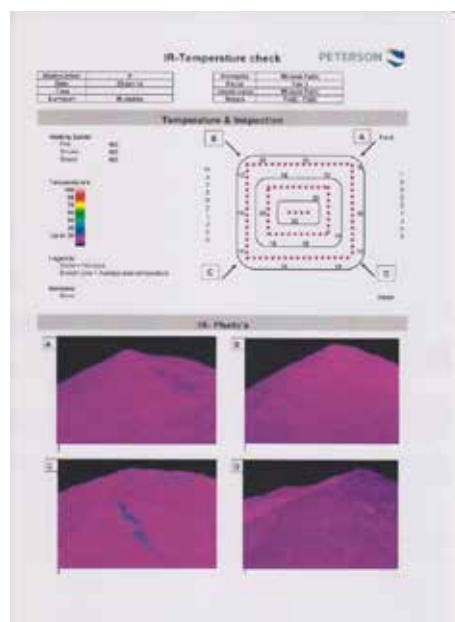
When the coals are on the conveyor belt, thermal imaging cameras allow us to see temperatures of the entire coal mass, not just of the coal surface.

the temperature of a coal load – before, during and directly after the loading process – is below 60°C. “Therefore, every load of coal that leaves this plant to Germany needs to be backed with a valid temperature monitoring certificate. With Germany as an important market for OBA, thermal imaging allows us to meet these requirements more easily,” says Dick Meijer. “We used to engage external measurement professionals for this, which was an extra cost for the end customer. Now we can do the measurement ourselves, not only at one moment in time, but continuously on a 24/7 basis. We can now provide our customers with a valid certificate as an extra service.”

### Camera set-up

The OBA terminal plant is now equipped with three rugged FLIR A310f cameras. Each camera is positioned on a tower from where there is a good view on the several conveyor belts, which transport the coal to the barges. This way, coals with high temperatures can be detected in time. By positioning the thermal imaging cameras as close to the barges as possible, OBA can visualize the entire conveyor belt stretch (up to 900 meters) and monitor the coal temperatures up to the last second before they are loaded onto the barges. This way, a barge never receives coals that are too hot.

The thermal video images are sent over IP to a central control room where they are continuously monitored. Operators make use of a proprietary software system that offers intuitive color codes to communicate about the real-time status of the coal loads. A green color code means that all coals are below a dangerous temperature and that there is no danger for self-combustion. Yellow means that temperature is increasing. In practice, this usually means that temperatures are between 40°C



Internal OBA report with IR temperature measurements of the coal stack

and 50°C. In this case, OBA already takes preventive measures, viz. digging out and spreading the coals. Code red means that temperatures are above 55°C, a situation where the conveyor belt can be forced to stop, preventing coals with excessive temperatures to be loaded onto the barge.

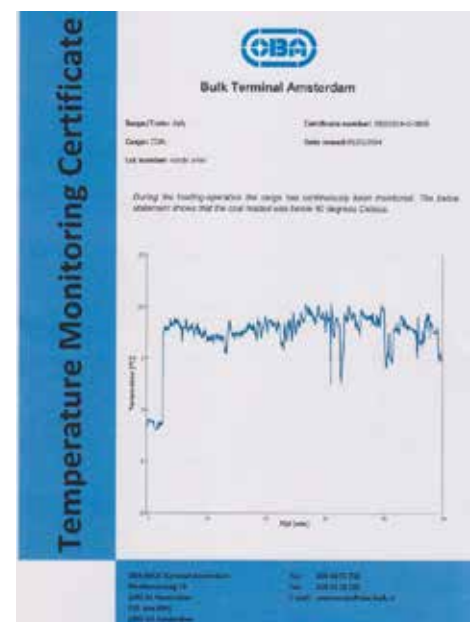
### Measuring in tough conditions

For this project, OBA selected the FLIR A310f, a highly sensitive and high-speed camera in an environmental housing. The housing increases the camera’s environmental specifications to IP66, without affecting any of the camera features.

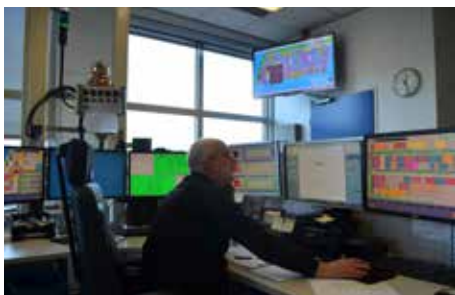
“After thorough consultation and testing with FLIR distributor Rato, we decided to choose the FLIR A310f, because it gave us very accurate and reliable results,” says Dick Meijer.

A number of requirements were decisive in OBA’s choice for the FLIR A310f. First of all, the camera had to provide very stable temperature measurement and be able to measure at high speed, along with the speed of the conveyor belt (3 meter per second). In addition, the A310f needed to be up and running 24/7 in any weather condition, be it rain, snow, extreme heat or below-zero temperatures.

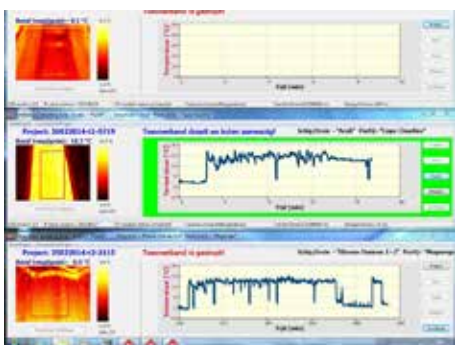
Dick Meijer: “We are also loading coal at night, so temperature measurements



Every load of coal that leaves the OBA plant to Germany needs to be backed with a valid temperature monitoring certificate.



The thermal video images are sent over IP to a central control room where they are continuously monitored.



Operators make use of a proprietary software system that offers intuitive color codes to communicate about the real-time status of the coal loads.



OBA combines the use of a temperature probe – the traditional way of measuring temperatures – and a FLIR E6 handheld thermal imaging camera.

should be possible at that time too. Luckily, thermal imaging is the ideal way to see at night. We also need to take into account specific situations. During snowfall for example, the snow falling on the coal stack can generate steam. A thermal imaging camera is able to provide reliable temperature measurements regardless of this phenomenon."

### Quick temperature scans on site

The coals are not only monitored on the conveyor belt before being loaded onto the barge. Also the large coal piles are monitored at least once per week. For

this purpose, OBA combines the use of a temperature probe – the traditional way of measuring temperatures – and a FLIR E6 handheld thermal imaging camera. The big difference between both technologies is that a probe will measure the temperature at one point; the thermal imaging camera provides temperatures measurements for a larger area.

"The handheld FLIR E6 is an intuitive solution to be used by our operators when something goes wrong," says Dick Meijer. "When in the control room, we receive a code yellow, we use the E6 to go up there

and see with our own eyes what is going on. The camera is very robust and very easy to handle, even with gloves on."



FLIR E6 thermal imaging camera

By positioning three A310f thermal imaging cameras as close to the barges as possible, OBA can visualize the entire conveyor belt stretch (up to 900 meters) and monitor the coal temperatures up to the last second before they are loaded onto the barges.



For more information about thermal imaging cameras or about this application, please contact:

**FLIR Commercial Systems**  
 Luxemburgstraat 2  
 2321 Meer  
 Belgium  
 Tel. : +32 (0) 3665 5100  
 Fax : +32 (0) 3303 5624  
 e-mail: flir@flir.com  
 www.flir.com

The images displayed may not be representative of the actual resolution of the camera shown. Images for illustrative purposes only.