



APPLICATION STORY

FLIR thermal imaging cameras ideal for oil detection

FLIR systems offers a full range of maritime thermal imaging cameras for every possible application.

Oil recovery is an important task that needs to be performed quickly and effectively in order to be successful. FLIR thermal imaging cameras are an ideal tool to help the oil recovery teams to do their job effectively.

To test the effectiveness of the maritime thermal imaging cameras of FLIR Systems for oil spill detection FLIR Systems set up a test in the OHMSETT tank in Leonardo, New Jersey. The OHMSET tank is one of the largest of its kind in the world, measuring 203 meters long by 20 meters wide by 3.4 meters deep. The tank provides a realistic full scale environment, complete with a wave generator and state of the art data-collection systems. The researchers from FLIR used it to replicate oil spills in realistic conditions.

The goal of the test was to obtain quantitative information to confirm that thermal imaging cameras see oil on water. In order to do that the researchers investigated 5 different kinds of oil in different sea states, from glassy calm to storm-like, at different viewing angles and at different times of day.

The conclusion was that FLIR maritime thermal imaging cameras excel in providing real time video and photos of oil, even in the roughest of seas, in glaring sunlight, with no light at all and from just about any angle.

How does it work?

The detection of oil spill is based on the differences between oil and water in temperature, thermal reflection and thermal emissivity. Due to a difference in thermal conductivity oil will usually absorb heat faster during the day, thus it becomes warmer than the surrounding sea water. This makes it show up on the thermal images as a hot spot. During the night, the opposite is true; the oil body will lose heat faster than the surrounding water, which makes the oil show up as a cooler region.

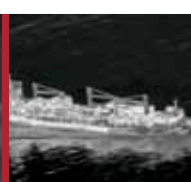
The OHMSETT tank in Leonardo, New Jersey, is one of the largest of its kind in the world.

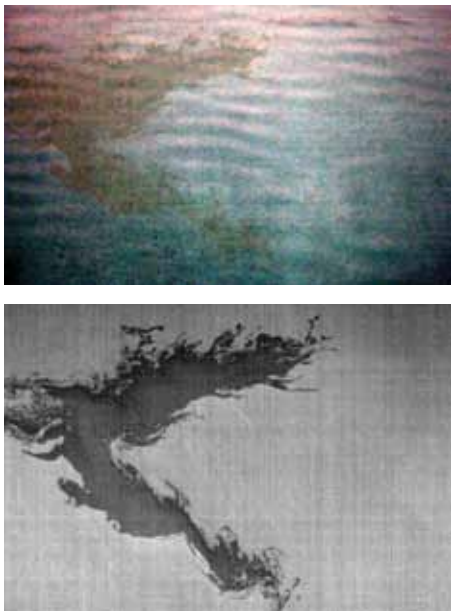
These FLIR thermal imaging cameras are pointed at oil spills in the OHMSETT tank at different angles.









A visible image and a thermal image of Doba/Chad crude oil, at a low camera angle, a glassy calm sea state, in full daylight.

During the day reflection oil also shows up in the thermal image because it reflects the thermal radiation from the sun differently. This is similar to the way that oil and water reflect sunlight differently, allowing the human eye to see a color difference.

Detect oil at night

Another difference that enables oil spill detection is a difference in emissivity. Although emissivity differs in the types of oil, generally speaking the thermal emissivity of oil is lower than that of water. This allows thermal imaging cameras to 'see' oil spill in complete darkness, which means that the oil recovery can continue during the night. That's very important because there's a very limited amount of time in which you can collect the oil before it sinks, dissolves or evaporates.

During the day thermal imaging systems also have an edge over visual imaging systems. Not only can thermal imaging cameras visualize oil spill in total darkness, they can also see through smoke, dust and light fog. And because visible imaging cameras rely on visual light they are much more susceptible to solar reflections and changes in the viewing angle, while these factors have very little effect on thermal imaging cameras.

DDE: visualize the smallest of thermal differences

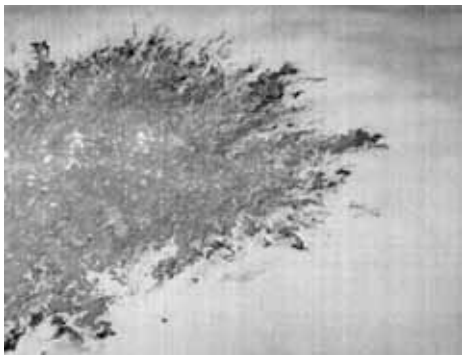
But not all thermal imaging cameras qualify for oil spill detection. The thermal imaging camera has to be very sensitive to small temperature differences. One reason why FLIR thermal imaging cameras are an ideal tool for oil spill detection is that they contain a built in image processing algorithm called Digital Detail Enhancement (DDE). This allows the camera to visualize even the smallest of thermal differences.

Put to the test

After the tests were finished, the thermal imaging cameras had to prove their usefulness in earnest. On April 20, 2010, just a few weeks after the initial tests the Deepwater Horizon drilling rig blew up. The explosion killed 11 workers and injured 17 others; another 98 people survived without serious physical injury. It caused the Deepwater Horizon to burn and sink, and led to the largest accidental marine oil spill in the history of the petroleum industry.

An oil recovery operator uses a FLIR HM-Series handheld thermal imaging camera to direct the positioning of oil recovery booms.

Visual image and thermal image of oil that escaped from the Deepwater Horizon as it sunk. Note that the oil is much easier to spot on the thermal image.



The oil spill shows up clearly on this thermal image.

FLIR maritime thermal imaging cameras were intensely used by the oil recovery teams to provide valuable information about the location of oil. Whether during the finding, containing or the consecutive cleanup, FLIR maritime thermal imaging cameras contributed to the entire recovery process.

FLIR maritime thermal imaging cameras can be plugged into just about every existing video monitor using standard connections and they integrate very easily with other on board maritime electronics.

A wide variety of oil spill applications

Thermal imaging cameras can not only be used at the time of an accident. They can also be very useful for monitoring oil spills during the oil transfer from oil storage bunkers to oil tanker vessels and vice versa. Thermal imaging cameras are also valuable tools for coastguard or other law enforcement agencies. They can track vessels that are illegally polluting our seas by cleaning their oil tanks in open water.

Thermal imaging cameras can monitor all these activities day and night, in practically all weather conditions. Furthermore, once they are installed on a vessel they can not only be used for monitoring oil spills but they can be used for night-time navigation, shipboard security and many other maritime applications as well.

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

FLIR Commercial Systems B.V.
Charles Petitweg 21
4847 NW Breda - Netherlands
Phone : +31 (0) 765 79 41 94
Fax : +31 (0) 765 79 41 99
e-mail : flir@flir.com
www.flir.com

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