



Seeing in total darkness in a maritime environment

The advantages of thermal imaging

Practically all of us associate the sea with holidays and fun, but it can be a dangerous place, especially in nighttime and bad weather. Yachts collide with other vessels, run on cliffs or other objects resulting in heavy damages and sometimes even loss of life. Some of these accidents happen in open water, others while navigating in harbors and ports.

Our eyes are the first line of defense against these hazards. Unfortunately, eyes are not the best detectors at night or in bad weather. Any accident at sea does not only have severe consequences for the vessel but also for its passengers and crew. A number of tools are available to help us detect potential dangers before they become a real hazard.

Thermal imaging: an excellent tool to help you see at night

One of these tools is thermal imaging. Thermal imaging is the use of an infrared camera to "see" thermal energy emitted from an object. Infrared energy can not be detected by the eye because the energy of the photons is too low to stimulate the photoreceptors in the eye. Also, thermal IR light does not get to the retina, because it is highly absorbed by the eye's lens and fluids. Infrared allows us to see what our eyes

cannot - invisible heat radiation emitted by all objects regardless of lighting conditions. Thermal imaging cameras produce images of invisible infrared or "heat" radiation. Based on temperature differences between objects, thermal imaging produces a clear image.

Thermal imagers are very effective in marine environments. They can detect objects floating in the water which may damage a vessel, or even worse, sink it. Other vessels, shipping lane traffic, buoys, bridges, ... it is all seamlessly detected by thermal imaging.

Although there are other technologies available for helping you to navigate during the night and to help you prevent catastrophes, thermal imaging outperforms them, has some advantages over them or it can complement them.



Bridge in total darkness



Thermal image of the bridge in total darkness. Even up to several kilometers away, seeing threats is an easy task for thermal imaging cameras.



Navigation lights

The oldest anti-collision systems on ships are lights. In ancient times, sailors would maintain small open fires on deck in order to be spotted by other vessels. Later these fires were replaced by electrical navigation lights.

Several types of lights serve as navigational aids at night. But even when all boats have proper lighting, it's very difficult to judge bearings and closure rates. But when boats have improper lighting, like a lot of them do, ... well, you don't really have a chance of avoiding an accident. Furthermore, navigation lights become less useful when fog or rain is obstructing your view. You might see an approaching vessel too late which can lead to lethal accidents.

Thermal imaging can see through light fog and haze. Although the distance a thermal imager can see is also obstructed by light fog and haze, it will give you a clear warning of an approaching vessel, in all weather conditions.

Visualize RADAR blips

RADAR, the abbreviation of RADIO Detection And Ranging is, a system that uses reflected radio waves to determine and map the location, direction, and/or speed of both moving and fixed objects. The first commercial RADAR systems were developed during the 1940's and today they are installed on practically every yacht.



The limitation of RADAR is that it only gives you a small blip on the screen when it is detecting an object. A thermal imager will give you a real image of the situation. This will help you to determine whether a certain object is a real danger or not.

Another limitation of RADAR systems is that it fails to pick up small objects. However, even objects that cannot be detected by a RADAR system, such as sail boats, wooden boats, floating debris, ... can cause massive damage to your vessel.

Light amplification

Light amplification, also referred to as I^2 technology, amplifies small amounts of visible light thousands of times so that objects can be seen at night. These systems scan an area and amplify the available ambient light to produce an image. Light amplification

does require a certain level of ambient light, but even starlight can produce an image on a cloudless night. A high-end image intensified camera can produce outstanding images on a clear moonlit night.

Because the system requires at least a minimum level of ambient light, conditions such as heavy overcast can limit its effectiveness. Similarly, too much light may overwhelm the system and reduce its effectiveness. Imagine yourself navigating in a harbor with the lights of the marina, or the skyline of a city, in the background. These lights will also be amplified and you will be totally blinded.

Contrary to light amplification systems, thermal imaging works by detecting the heat energy being radiated. It needs no light at all and produces a clear image in the darkest environments.

Low-lux cameras

The light requirements to produce an image are measured in lux. The lux is the rating for how well the camera sees in low lighting conditions. The smaller the number, the less light the camera needs to produce an image and the better the ability to see in the dark. Low-lux cameras provide an image in an environment that is too bright for light intensification equipment but still restricted by darkness. But do not assume that if it is pitch black you can still see well with a low lux camera.

Contrary to a thermal imaging camera, a low lux camera will not produce an image in total darkness. Thermal imaging systems sometimes combine one or more thermal imaging cameras with a low lux camera. This gives you the ability to see during daylight and low-light conditions.

Thermal imaging: more than just night time navigation

Thermal imagers are excellent tools for short to medium range threat detection. Today, more than ever, shipboard security is important. Thermal imaging allows you to see what is around you, even at long ranges. You can monitor activity in port or at anchor and see approaching vessels or people without alerting them that they are being watched.

Each year, numerous people die after falling overboard and not being found fast enough. Finding a person that has fallen overboard within the shortest possible time-frame is of the utmost importance. Not only can the person float away from the vessel but hypothermia is an important factor to take into account. Thermal imaging can help find a person in the water before it is too late.

Thermal cameras work during the day as well, and give users the ability to see through marine haze more effectively than with the unaided eye. It is not affected by glare from the sun. Thermal imaging allows you to see through the glare, and detect possible obstacles, when navigating during sunrise or sunset.



Visual image



Night Vision goggles



Thermal image



Low light image

Low light to no light comparison



Thermal image

If you would like more information about thermal imaging and how it can protect your vessel and its crew, please contact:

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