



# Maritime

Gathering evidence during surveillance operations



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However fast the coastguard patrol craft is, the target vessel takes only seconds to dump the illicit cargo overboard. The same can even be said of a helicopter. If a noisy helicopter comes over the horizon, obviously heading towards the target vessel, then the same dumping procedure is likely to take place.

At a time when piracy, smuggling and terrorism is becoming increasingly organised and hi-tech, one may assume that the perpetrators expect a certain amount of loss, and build it into their "business plan". The challenge is for the intercepting craft (be it a helicopter or a vessel) to gather useable and watertight visual evidence before moving into the phase of interdiction.

To do this requires an exceptionally long zoom capability, generating extremely high definition images, with the ability to record the results. This capability also needs to be available at night and in poor weather conditions. No single sensor can ever provide the whole picture and it's entirely natural that radar is the first sensor of choice in maritime operations. However, radar cannot read a ship's name, radar suffers degradation in capability during rough seas, (due to "clutter"), and radar can only tell the approximate size of a vessel.



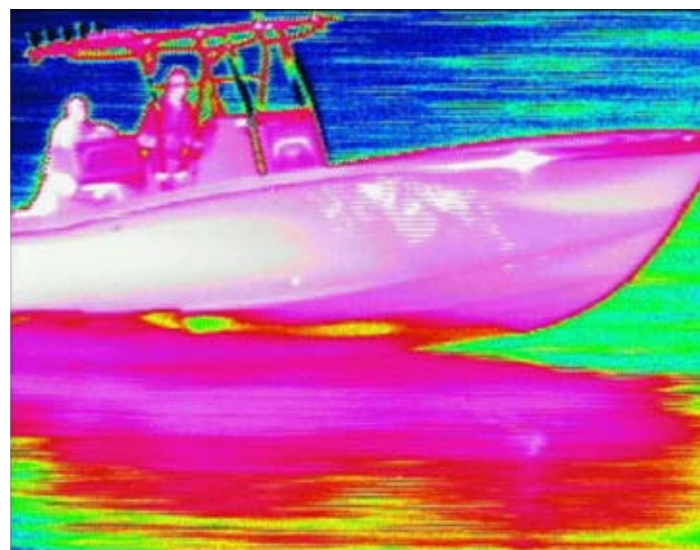
## A truly effective suite of sensors must include

- A gyro stabilised High Definition daylight visual camera system
- A stabilised Infra Red capability with multiple sensor settings.
- The ability to reliably record both of the above.
- The ability to grab still frames from the moving images.
- The ability to transmit a compressed version back to Force HQ.



The Cineflex V14 was originally designed to achieve rock steady images from a moving helicopter. When first released in 2005 it immediately became the industry standard as users became aware of just what an enormous step had been taken when compared to the old technologies of competing systems.

In early 2007 Cineflex was bought by Axsys Technologies who brought to the party their wide capabilities in thermal imaging, resulting in the release of the V14 Multi Sensor system (V14MS). Axsys have decades of experience in specialised military and civilian optical systems and were the company who fixed the flaw on the Hubble Space Telescope. They have more recently been chosen as prime optical suppliers for the James Webb Space Telescope, the replacement for Hubble.



Using a Cineflex mounted, only temporarily, to the deck of a fishing boat we can tell that this ship....  
....just beyond the curvature of the earth!.....  
... is from the Kosan line.

One of the techniques employed in discreet surveillance operations is for the helicopter, or patrol craft, to avoid heading towards the target and to pass it by on an apparently unrelated course. Even if it's spotted in the far distance, which is highly unlikely, it will be assumed that it's on another mission entirely.

The next issue to consider is High Definition. This is a rather over-used expression and is sometimes applied to camera systems that are actually outputting images that have been compressed by a factor of up to 60. Both versions of the Cineflex system use the very latest Sony HDC1500 daylight camera which outputs true 1920 x 1080 High Definition. The implication is enormous and has to be seen to be truly appreciated. (A standard definition video monitor uses only around a quarter of this number of pixels).

So, once you combine absolute stability, a very long lens and true High Definition you are beginning to get into the realms of science fiction. For example the Angenieux 40 x 22mm lens will zoom in to 880mm. There is then an optical doubler that can be selected, to immediately extend the range to 1760mm. The further capability to execute digital doubling in-camera takes the lens out to an unbelievable 3520mm.

In a maritime surveillance context the human eye will be virtually unable to detect the distant vessel, from which the Cineflex is already reading the name or, in this case, recording the activity on the cliff top.

## So what can a Cineflex bring to the subject of Maritime Security Operations?

First and foremost the issue is stability. Cineflex employs a gyro sensing and feedback system of such supreme accuracy that we haven't yet found its limits. The more stable the platform, the longer the lens that can be used. As the following pictures (or "frame grabs") show, the Cineflex has been successfully proven to be an effective surveillance tool from as far away as **12 nautical miles and 12,000 feet**. At that height and distance the target has no idea that they are being watched, much less recorded! Many successful prosecutions have already been carried out in the United States using this equipment



We now move to the Infra Red sensor which sits alongside the daylight camera. At a definition of 640 x 512 and an operating wavelength of 3 – 5 nanometres this is the perfect surveillance sensor for operations in poor visibility or at night. The thermal signature of a vessel exhibits properties that are invisible to the human eye (and to radar). Questions, such as whether the boat's engine has recently been running or whether there are possible stowaways or pirates hiding beneath a canvas cover, can be quickly answered with the IR sensor. Once again this information can be fed to a video recorder to provide evidence for later prosecution.

“Light and fast patrol boats are cost-effective carriers of multi-sensors”

First Admiral Zammani Bin Mod Amin. MMEA. LIMA 2007



Of course the IR imager also adds Search and Rescue (SAR) and disaster relief to the role capability of the helicopter or surface vessel. A warm body will immediately stand out from its surroundings whether that be the water in which they are floating or the undergrowth under which they are sheltering. You cannot hide from an IR sensor and the days of camouflaging your small craft in a small coastal inlet have now disappeared. With the Cineflex V14MS2 the daylight image and the IR image can either be viewed on separate monitors, viewed as “picture in picture” on one monitor, viewed side by side, or even overlaid and “fused” together.

**Further options that might be considered for the ultimate package are:-**

- Laser Pointer**
- Laser Rangefinder**
- Moving Map System**
- Frame Grabbber**
- Geo-pointing**
- Auto Tracker**
- Radar and navigation interface**
- Night Sun interface and slaving**
- Moving Map interface**

Although the Cineflex V14MS2 was originally designed for helicopter applications it's now been proved to be just as effective working from a surface vessel. The totally sealed unit is tested by water immersion during manufacture. The specially designed shock mount allows the unit to absorb the very roughest of shocks likely to be experienced by a patrol boat, thus allowing the 5 axis gyros to do their job in maintaining ultimate picture stability.

A system that can actually see further than the curvature of the earth at sea level is truly the ultimate tool for any serious maritime patrol force!

*“Piracy attacks are getting more organised and significantly more violent. Technology is not an answer in itself, it needs to be incorporated into the bigger picture.”*

**Admiral Khamthorn Pumhiran, Royal Thai Navy**

*“Identification and then gathering physical evidence is a big challenge.”* **Admiral Maritime Dato' Mohammad Bin Nik**  
**Director General MMEA**