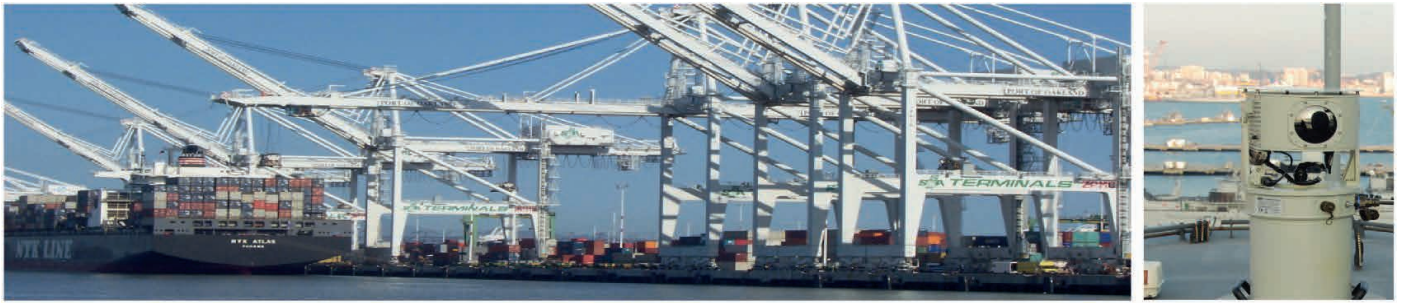


PANORAMIC NIGHT AND DAY PORT SURVEILLANCE



OVERVIEW

Customer: Major port in Gulf of Guinea, West Africa.

Challenge: Provide complete, all-weather, 24/7 real-time port surveillance over a very wide area to detect small floating and moving RHIBs (rigid-hulled inflatable boat) or small crafts. Complement existing systems (Radar, AIS, VTS) by immediate detection and identification capabilities.

Solution: Electro Optical Industries' Spynel infrared surveillance system, equipped with Moog acoustic deterrent system.

Results: Reliable and cost effective night and day full automatic watch, detection and alerts in the harbor and various hot areas of the port.

Conclusion: EOI's Spynel infrared system provides thorough and accurate coverage of ultra-wide areas while offering a lower total cost of ownership than a combination of multiple sensors.

CUSTOMER

Electro Optical Industries effectively solved maritime surveillance and coastal security issues for a major port in the Gulf of Guinea in West Africa. This strategically located port serves as a critical shipping hub and "economic engine" for its home country and many neighboring nations. The port is a central artery for numerous valuable imports including food, construction materials, petroleum, agricultural supplies and consumer goods, with an annual turnover of more than 300 billion CFA francs (\$457.32 million). A 5-year funding program managed by the US government aimed at promoting investment and private sector activity in the country, including the fight against insecurity in the country's main port as one of its key projects, since a variety of persistent threats hindered economic growth.

CHALLENGE

Maritime environments pose unique challenges, which can render conventional surveillance methods ineffective. In this case, radars could not visualize the entire environment at short range (less than 2 nautical miles) and could not detect certain small crafts such as dugouts due to strong sea clutter. Reflection, darkness and severe weather impeded visual detection, even with visible camera or binoculars assistance. Port security personnel needed a solution which could provide lookouts with reliable day and night, all-weather visual surveillance to detect ships and small crafts at a distance of several nautical miles while allowing smooth integration with existing sensors such as radars, watch team, AIS, VHF, VTS and visible cameras.

Critical surveillance areas included the harbor approach, the entrance fairway, the port basin, and the wet dock. In each region, security personnel had to monitor the speed, behavior and response-to-contact time of incoming and outgoing vessels. Detection range had to meet or exceed 1000m, with a 360° horizontal field of view. Ultimately, personnel required a total surveillance system that would enable them to detect unwanted or unqualified ships, direct traffic and prevent potential collisions.

As part of the US government funding program, the organization overseeing the port was tasked to modernize, implement and maintain new security solutions. As a condition of the program, port officials had to document and demonstrate significant improvements in safety, security and operational efficiency.

SOLUTION

Electro Optical Industries' Spynel, panoramic infrared security system provided the precise level of comprehensive surveillance that port personnel required. The Spynel-C uses a continuously rotating line scan sensor to produce a 360 degree image with 6M pixels and detects and tracks an unlimited number of intruders in real time. Essentially the Spynel operates like a high definition "optical radar", providing operators with clear, reliable, actionable data.

CASE STUDY SPYNEL

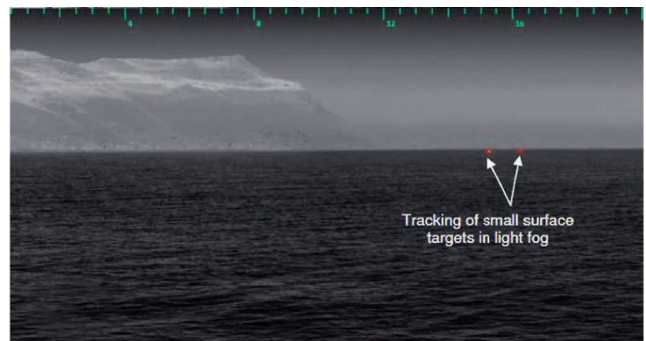
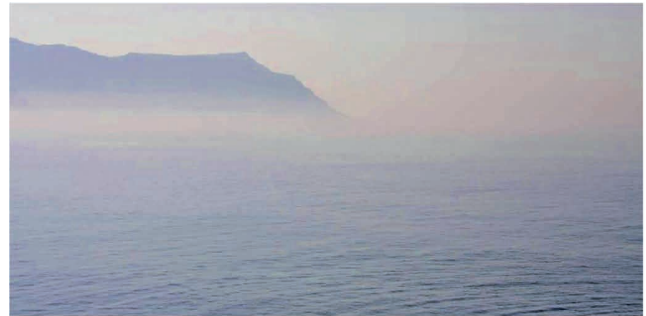
Out of multiple models in the Spynel product line, the Spynel-C 2000 camera was chosen for deployment in the port environment. The Spynel-C 2000 model features the complete 360° horizontal field of view along with a 10° vertical range. The system was mounted to a stationary, 10m tower located on the outermost jetty. From this single elevated vantage point, the infrared camera could obtain an unobstructed view of the entire port operational area. The camera's advanced long wave infrared sensor is capable of detecting a small 0.5 x 1.5m RHIB or similar craft, day or night, at distances over 2.5km. It can detect larger 10x8m vessels at over 6km, a fighter jet at 13km, and a tanker at 20km, even in adverse weather conditions, including fog and rain. To augment the surveillance capabilities, the port-deployed Spynel-C 2000 was outfitted with a sophisticated Moog Acoustic Deterrent System, which broadcasts a sharp, targeted warning sound beam, to intimidate intruders.

In addition to providing complete 24-hour, all-weather surveillance, the Spynel are also easy to operate, even for civilian personnel with no experience using infrared technologies. User profiles allow for a simplified display for operators, while system administrators can access advanced functionalities. The intuitive, user-friendly software interface reduces operator fatigue, which in turn reduces the potential for human error during surveillance procedures. Detection settings are automatically set by the system. Sound alerts can be produced when intruders are located and highly customizable detection zones can be activated to avoid alarm overload. Further, the interface is pre-programmed with monitoring algorithms that are optimized for the maritime environment. The maritime optimization helps eliminate false alarms, and allows users to easily distinguish between swimmers, boats and buoys without interference from wave patterns or solar reflection. Position of intruders and tracks, as well as images from the Spynel were easily integrated within a third party software used by the port to centrally manage all their sensors. The superior performance of the Spynel-C 2000 infrared technology, along with the comprehensive 360° x 10° field of view and user-friendly control interface provided port officials with a total maritime surveillance solution that met and exceeded their needs.

RESULTS

Since the Spynel infrared system was deployed, port officials have seen dramatic improvements in detection ability and overall maritime security. In initial tests, swimmers, boats and additional watercraft were rapidly and accurately detected.

The Spynel system consistently provided surveillance data with enough time for leadership to coordinate interdiction forces when quick action was necessary.



The top picture and Spynel-C footage (bottom) were taken at the same time: targets are easily tracked by the Spynel-C in light fog conditions but are invisible to the naked eye.

CONCLUSION

EOI's Spynel infrared system provides thorough and accurate coverage of ultra-wide areas while offering a lower total cost of ownership than a combination of multiple other sensors. The stand-alone system is economical to operate, requires minimal maintenance, and is able to perform in all weather conditions. Based on the success in the port deployment, EOI Spynel infrared surveillance systems are an ideal strategic solution to ensure heightened security in the maritime environment.

The Spynel-C performance was tested for a full year by a defense naval laboratory, under diverse scenarios, and compared with the performance of other sensors in a maritime environment.

Founded in 1964, Electro Optical Industries designs, develops, assembles and sells complete optronic systems for security, industrial and civil applications. EOI established itself as an international reference for infrared technology innovation through the development of its award-winning real-time 360 degree infrared camera, the Spynel (2008 Product of the year from



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