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Marine Disaster Recovery with Intelligent Systems

Moxa provides marine-certified computers for oil spill detection systems that process real-time data collected from remote sensing networks to enable mission-critical recovery operations.

The MC-5150* embedded marine computer (top) and the MPC-2240* marine panel computer (bottom)

Introduction

Oil spill contingency plans are essential to minimizing the risk of oil spills in the ocean. The success of these plans depends on accurate, real-time data on the location, size, and movement of a spill and a powerful computing infrastructure that can consolidate and process this data to support monitoring and recovery operations.

Moxa manufactures marine-certified embedded and panel computers for the oil and gas industry. Powered by Intel® processors, these compact and rugged marine computers are designed to deliver the superior computing performance, reliability, and power efficiency to ensure stable operation even in extreme marine environments.

Challenges

Connecting Disparate Devices to a Network Infrastructure

Oil spill monitoring and recovery operations utilize remote sensing networks comprised of individual components that collect data in the ocean. Consolidating this sensor data requires a marine computer capable of supporting network communications and the I/O standards used in maritime systems.

Powerful Computing Solution for Harsh Environments

Demanding maritime applications require computers that can handle the heavy workload of processing large amounts of data in real time. In order to provide dependable operation in harsh ocean environments, the oil and gas industry requires robust, fanless computers built to marine standards.

Flexible Integration

Vessels require solutions that are easy to integrate into the bridge's computing infrastructure. They require marine computers that provide computing performance, simple integration, and flexible I/O connectivity in a small form factor.

Delivering outstanding performance and reliability with marine computers based on Intel® architecture

Solution

Marine-Certified Computers for Mission-Critical Operations

Moxa's series of marine computers (MC) and marine panel computers (MPC) deliver the superior computing performance and reliability of Intel® architecture in a compact, fanless form factor that is certified for the challenges of marine operating environments. Supported by Moxa's service network in more than 70 countries, these solutions are designed to provide dependable operation of Oil Spill Detection (OSD) systems worldwide.

Collecting Information at Sea: Remote Sensing Networks

Remote sensing networks play a vital role in mitigating the impact of oil spills in the ocean. Made up of aerial and local surveillance networks, individual remote sensing components are connected to the network infrastructure to provide real-time data about conditions in the ocean. They collect and process crucial data to help operators in the control center make informed decisions.

Moxa's MC* and MPC* series of Intel processor-based marine computers enable open, standards-based environments that deliver the reliable, energy-efficient operation and powerful computing performance required to capture, catalog, and monitor the data generated by various connected components.

Performing Continuous Surveillance

Remote sensing networks continuously monitor conditions in the ocean to help oil and gas companies identify possible spills and develop contingency plans. OSD monitoring is conducted by both periodic aerial thermal imaging and visual inspection by airplane, helicopter, and satellite and the continuous surveillance of systems set up on offshore installations and vessels.

In addition to alerting operators of potential spills, remote sensing networks provide baseline data for areas of the ocean to identify economically and environmentally important locations and ensure the appropriate recovery infrastructure and equipment are available to manage recovery operations effectively in the event of an oil spill.

Managing Efficient Recovery Operations

Should an oil spill occur in the ocean, aerial and local surveillance determine the location and extent of the spill. When aerial surveillance is not possible because of poor visibility or limited resources, vessels installed with OSD systems establish a search pattern around the affected area to provide data on the position, area, and drift of the oil spill.

The data captured and processed by the OSD system on these vessels helps the control center guide oil recovery vessels and identify the effective placement of mechanical recovery devices to contain the oil spill.

Making Sense of Information: Oil Spill Detection System

Moxa provides a range of panel and embedded computers for OSD systems that are certified by marine authorities for use in the bridge system of vessels and offshore installations. Moxa MC and MPC series computers are powered by the latest Intel processors, including 4th generation Intel® Core™ i5 processors, to provide the computing performance required to process the enormous amounts of data received in real time.

Fanless MC and MPC series marine computers are designed to install easily into vessels' bridge systems and operate reliably within a wide temperature range

in enclosed spaces. These compact computers have no moving parts and feature hardened enclosures and integrated I/O connections.

The OSD system captures, consolidates, analyzes, and distributes data from disparate sources within the remote sensing network to support decision-making during recovery operations. This can include data from radar and navigation sensors such as GPS, gyrocompass, anemometer (wind speed sensor), and AIS (automatic identification system)—plus satellite visual and thermal imaging, aerial video and photography, and marine X-band radar data.

Staying Ahead of the Competition

Moxa set the goal of designing the best ODS computers for the enclosed spaces and harsh conditions of marine environments. By designing the MC and MPC series on Intel architecture within fanless enclosures, and addressing the thermal requirements at the system level rather than looking at thermal requirements of discrete elements, Moxa was able to engineer compact marine computers that run cooler and more reliably without sacrificing computing performance.

Powered by the latest Intel Core processor family and featuring the Intel® chipset for the Platform Controller Hub (PCH), and Intel® Solid-State Drives (SSD), Moxa MC and MPC series marine computers provide powerful, energy-efficient computing performance and superior reliability under a wide range of operating temperatures.

The MC and MPC series are IEC 60945, DNV, and IACS-E10 certified, making them suitable for use in mission-critical OSD systems. And with the energy-efficient computing performance of Intel processors, Moxa's MC and MPC marine computers also provide superior

reliability. Moxa's laboratory tests on the MC-5150-AC/DC* marine computer, for example, showed a calculated mean time between failures (MTBF) of up to 220,490 hours. In addition, Moxa backs the MC-5150-AC/DC marine computer with a 3-year warranty.

Simplifying Integration

To support the amount of data collected and processed in OSD systems, marine computers also need to deliver outstanding I/O performance. Moxa's MC and MPC series marine computers feature built-in I/O connectivity for flexible integration into bridge systems.

For example, the MC-5150-AC/DC marine computer comes equipped with a range of I/O connectivity options that eliminate complexity and the need for external serial converters. This includes:

- 2 Gigabit Ethernet ports
- 2 RS-232/422/485 isolated serial ports
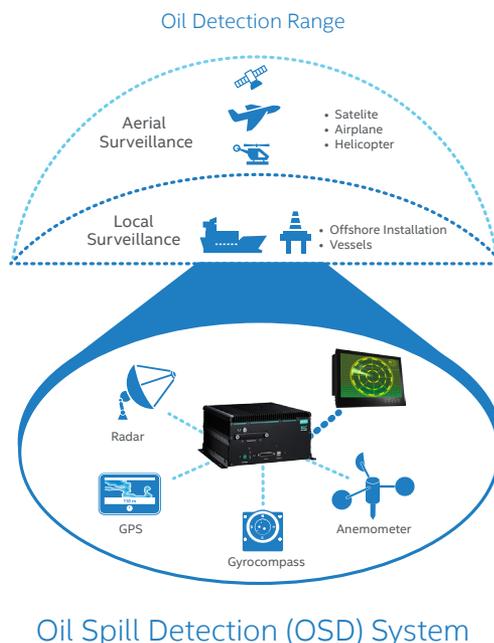- 2 RS-232 ports
- 8 NMEA ports

- 6 USB 2.0 host ports
- Support of dual independent displays via DVI-I and VGA

Moxa MC and MPC computers also leverage the fact that the Intel Core processor family merges the I/O controller onto the processor to further reduce network latency.

Marine Computing Innovation

Winner of the Red Dot Award for Product Design in 2014, the Moxa MPC-2240* marine panel computer offers seamless integration into a vessel's bridge. The MPC-2240 incorporates a high-quality, 24-inch, flat-glass display with wide viewing angles, full-range dimming, and the superior visual clarity of up to 1920x1080 resolution. The large multitouch screen reacts to direct skin contact, through gloves, or a stylus.

Like Moxa's embedded marine computers, the MPC-2240 marine panel computer is certified for marine applications, and it features a rugged and fanless enclosure with an IP22 rating for protection against moisture and dust.

Oil Detection Range

Aerial Surveillance
- Satelite
- Airplane
- Helicopter

Local Surveillance
- Offshore Installation
- Vessels

Radar

GPS

Gyrocompass

Anemometer

Oil Spill Detection (OSD) System

Solution Snapshot

Moxa MC* and MPC* series marine computers are based on industry-leading Intel® architecture, offering high-performance computing, energy efficiency, and reliable operation for demanding marine applications and environments.

- Unprecedented performance with 3rd and 4th generation Intel® Core™ processors

- Integrated I/O connectivity featuring marine-specific NMEA ports, industry-standard USB ports, RS232/422/485 serial ports, and Gigabit Ethernet ports

- Careful thermal engineering to run cooler and more reliably under a wide range of operating temperatures—made possible by internal components built on Intel architecture

- Compliant with marine standards, including IEC 60945, DNV, and IACS-E10

For more information on Moxa's marine computers, visit:
www.moxa.com/solutions/maritime/web/products.htm