How to Choose a Marine Computer: Criteria for Selection

Selecting the right computer for a marine application is a complicated process with many requirements.

Technological advances have transformed the way many industries do business, and maritime shipping is no exception. Modern ships host an ever-increasing number of electronic devices and equipment. Such devices include sensors, radar systems, conning systems, data acquisition systems, and navigation information systems. Powerful computers are needed to effectively integrate, monitor, and optimize these peripheral devices. Selecting a computer that's up to this challenge has become a crucial part of configuring a first-rate seagoing vessel. However, selecting the best computer for your marine applications can be a complicated process. This white paper explores the major hardware, software, and display requirements for marine computers.

Hardware Requirements

The computers deployed in marine applications must provide operate reliably in a demanding oceangoing environment. Look for computing solutions that meet industrial standards and are designed specifically to maximize reliability. Generally, the computers should possess the following attributes:

Fanless and Cableless: Using fans and cables in a system increases the number of components and moving parts. This compromises reliable system design, because it adds more potential points of failure and additional joints to suffer wear and tear. Instead of using fans, seek a computer manufacturer

that selects components which generate less heat but can still maintain high system performance in extremely harsh environments. In addition, a cableless design also reduces the noise produced and ensures reliable and stable operations

Compact Size with Rugged Design: Space is at a premium onboard a ship. Computers used in marine applications should come in a compact size to fit into the narrow chambers and corridors of a ship without compromising cargo space or crew comfort. In addition, computers with a rugged design and high-quality components allow a device to disdain the environmental hazards of oceangoing applications.

High Performance: Marine computers should provide high performance computing in order to support a variety of marine applications. On a ship a marine computer will be called upon to handle complicated industrial tasks such as data acquisition, data computing and information analysis, and also to serve as front-end controllers to reduce the load on the back-end servers. Generally speaking, the marine computer will need at least an x86-based grade processor to shoulder this workload.

Software Requirements

Easy-to-use Platform: Marine computers should use an operating system platform that is easy for users and developers to use. For example, operating systems such as such as Windows XP, Windows XP Embedded, Windows 7, or the open source Linux operating system provide a user-friendly platform. Programmers will also find that it is easier and more convenient to develop software on familiar platforms.

High Software Compatibility: Since the maritime system consists of many different devices, a great number of different software applications are used. For this reason the computing solution must be able to integrate comfortably with all of these different programs

Customized Software: A marine application may require unique functions that can only be accessed by designated

onboard staff, making it necessary to implement tailor-made software. For example, an application might include data that is highly confidential, should only be accessed by the captain, and is password protected. Unique software would be needed to fulfill this requirement.

Display Signage Requirements

Display signage used in marine applications must also meet industrial-grade standards to ensure reliable performance in harsh ship and harbor environments. In addition, they need to have the following features for smooth integration with the many advanced technologies used in maritime applications:

Wide viewing angle, optical bonding, and full dimming are essential marine display features.

Wide Viewing Angle: This feature guarantees that the displays can be clearly visible from all angles without color washout. Wide viewing angle gives users more flexibility and translates into higher crew mobility.

Optical Bonding: Normal displays that are used outdoors can be beset by fog and sunlight reflection issues that compromise readability. Optical bonding adds a layer of protective glass secured by optical-grade adhesive. This feature increases the contrast ratio to improve the clarity and readability of display information. The protective glass also improves the durability of the marine display.

Full Dimming: This feature allows brightness ratio adjustments from 0% to 100%, providing the greatest possible range for enhanced flexibility and convenience.

Certifications

The equipment and control units used in marine applications must meet international, industry-recognized marine standards and certifications. This will ensure the safe, reliable, and continuous operation of the applications. Important certifications in this category includes:

DNV: Det Norske Veritas is an independent foundation whose main purpose is to safeguard life, property, and the environment. It has established regulations to govern the standards for equipment used on ships. For example, the DNV 2.4 directives regulate the anti-vibration and anti-shock standards for computers installed on ships.

IEC 60945: This standard governs general requirements for maritime navigation and radio communication equipment and systems. It contains many testing measures such as power supply, durability and resistance to environmental conditions, immunity to electromagnetic environments, and safety precautions.

IACS E10: The International Association of Classification Societies is a non-governmental organization that is dedicated to ship safety and clean seas. IACS provides a unique contribution to maritime safety and regulations through technical support, compliance verification, and research and development. IACS UR E10 provides the standards concerning navigation to unify environmental test specification as well as regulations for maritime electrical control and instrumentation equipment and marine automatic steering systems.

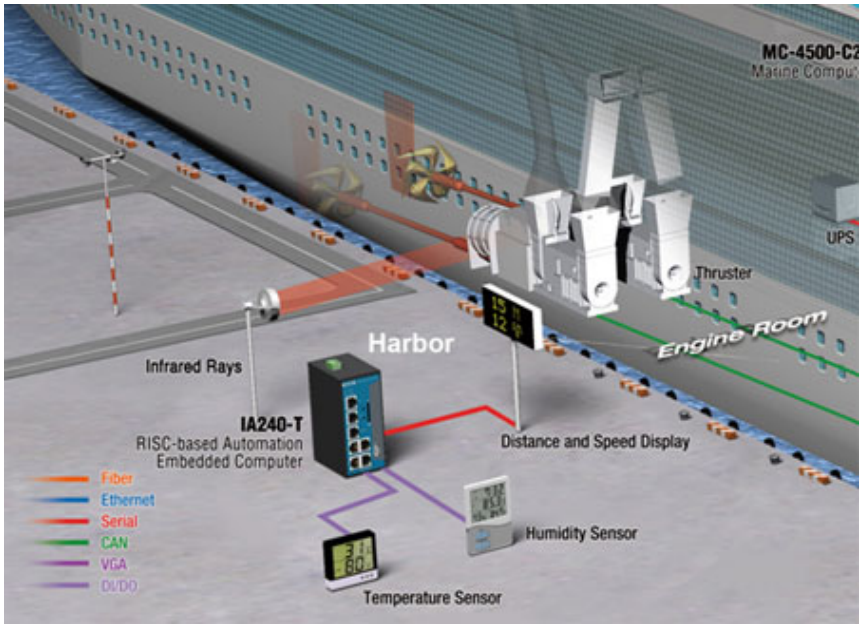
ECDIS: Electronic Chart Display & Information System color calibration compliance ensures precise positioning information and intuitive route and navigation planning functions to improve the safety and efficiency of seagoing vessels. An

ECDIS-compliant computer can help mariners handle various navigation-related tasks. ECDIS digital charts, displays, and data make marine navigation easy and reliable.

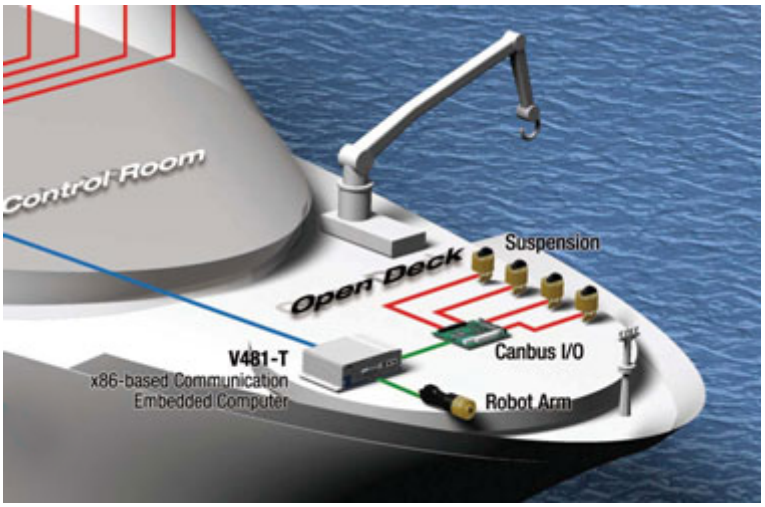
The Complete Marine System

In addition to general hardware and software requirements, marine computing devices need to meet specific requirements based on their intended purpose. A typical marine application falls into one of four distinct areas, located both onshore and offshore. Although dispersed, applications in each of these locations must be able to link to each other and respond to central control and monitoring.

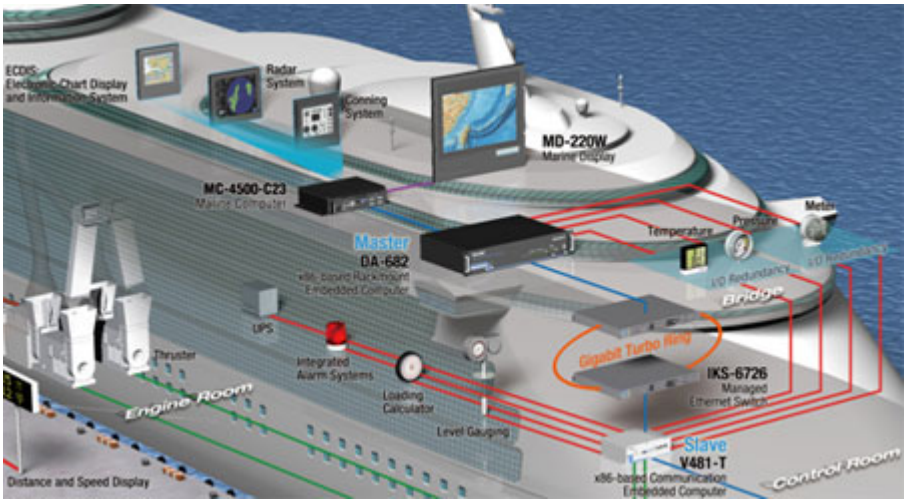
Harbor: Onshore, harbor equipment detects and manages the distance between the ship and the harbor for precise docking maneuvers. A distance and speed display, infrared ray system, humidity sensor, and a temperature sensor are usually used. All of these devices need to be centrally controlled and monitored by a computer that is powerful and robust. This computer needs to possess multiple DI/DO interfaces to connect to the many different devices, and provide front-end data computing and storage to manage delicate berthing and unberthing operations.



Open Deck: Equipment monitors and controls the loading and unloading of cargo on the deck of the ship. In most cases, there will be a suspension system and a robot arm system that runs different protocols such as CANbus, Ethernet, and serial communications. These protocols also need to be monitored and controlled by a powerful and robust computer. This computer needs to support the protocols, such as CANbus, that are commonly used by deck cranes, and provide a fast, reliable connection to the control room with gigabit Ethernet.



Control Room: The central control system connects other devices on the vessel and performs centralized management tasks. This is where you will find a wind sensor, time sync unit, and a computer that performs different tasks and communicates with the devices in the Open Deck and Bridge area. Additional devices include level gauges, alarms, loading calculators, and a UPS. With so many devices to manage, the embedded computer needs to support multiple CANbus and serial connectivity ports.



Bridge: This area is the heart and soul of a ship; this is where the captain and his crew navigate the ship. The bridge is often home to a bevy of specialized devices, such as a conning system, GPS system, radar system, ECDIS (Electronic Chart Display and Information System), and a navigation information system to help with ship navigation. Multiple serial connections are needed here, as well as Ethernet connectivity and marine display solutions. Integrated display panel/computers are particularly attractive here as a solution already designed to work well together.