

MARINE VESSEL INFORMATION PROCESSING METHOD AND MARINE VESSEL INFORMATION PROCESSING DEVICE

TECHNICAL FIELD

[0001]

The present invention relates to a marine vessel information processing method and a marine vessel information processing device for causing each of in-vessel computers and land-side computers to integrally process navigation data and engine data on managing-target vessels.

BACKGROUND ART

[0002]

In the maritime industry, a sharp increase in the number of vessels along with expansion in vessel operation scale in these days has caused shortage of maritime officers and land-based supervisors. In addition, crews have become multinational, operation management bases have been globalized, and furthermore international security and environment rules have been strengthened. Accordingly, there is an urgent need for rearrangement of vessel operation system to respond to these situations. Especially, as a countermeasure against "threats of terrorism and piracy" and "environmental pollution caused by marine accidents", the move to establish and revise the ISPS (International Ship and Port facility Security) code, the SOLAS (Safety of Life at Sea) convention and the like has been being accelerated. The ISPS code is an international security code for ships and port facilities, and is enforced to protect maritime works from threats such as terrorism, piracy and smuggling.

[0003]

This requires the maritime industry to efficiently process enormous quantity of information in order to comply with laws related to this move and to achieve safety and efficient vessel operation. Here, the processing of information includes the organizing, communicating and storing of the information. To satisfy this requirement, it is necessary to implement sea-land cooperative vessel management in which managing-target vessels and land-side offices that manage operation of these vessels collaborate in supporting the operation of the vessels.

[0004]

Meanwhile, technology innovations in communication means used for transmitting information have been developed from conventional low-speed communication schemes to "high-speed, always-on communication schemes" (maritime broadband communication). In addition, marine vessel information processing has been being ubiquitous at an accelerated pace toward the realization of an environment allowing people to access information networks from anywhere at any time.

[0005]

Meanwhile, even in the current information processing for information on vessel operation, each of information pieces respectively outputted from various navigation devices and devices such as a main engine and an auxiliary engine can be used only with software dedicated to the corresponding device. Thus, a service to collect only navigation data of vessels or only engine operation data of vessels to provide the collected data to a land-side management company has already been offered.

[0006]

As an example of this service, provided is a method, a

device and a system for appropriately maintaining a lubricating oil amount supplied to a diesel engine of a vessel as described in Japanese Patent Application *Kokai* Publication No. 2003-90226. The method, device and system for controlling lubricating oil amount supplied to a diesel engine are as follows. An engine control unit detects engine lubrication information such as temperature of a cylinder liner of a vessel, and transmits the information to a land-based supplied oil amount control device through a communication satellite. In response, the supplied oil amount control device compares the received engine lubrication information with control criterion data to create supplied oil amount control information, and transmits the information to the engine control unit. Upon receiving the supplied oil amount control information, the engine control unit controls a lubricator on the basis of the supplied oil amount control information.

[0007]

Meanwhile, there is a close relationship between the navigation data and the engine operation data, and thus the need to integrally manage these data has been growing. However, though allowing the viewing of the display screens respectively for different data sets, the current information processing systems display, on a different screen by using different software, each of navigation data sets respectively outputted from different devices and engine data sets respectively outputted from devices such as a main engine and an auxiliary engine, for example. This is because provision software for a data logger of a device is different among the devices or the manufacturing and providing companies of the data loggers. Though some current systems display the integration of

navigation data sets outputted from several devices and/or the integration of engine data sets outputted from devices such as a main engine and an auxiliary engine, it is still difficult to view the navigation data and the engine data in association with each other. Accordingly, the current information processing systems have the following problems. First, it is difficult to make comprehensive determination by comparing navigation data and engine data on managing-target vessels. Second, it is difficult to compare operation data sets respectively on multiple vessels by displaying these data sets in parallel.

Patent Document 1: Japanese Patent Application Kokai
Publication No. 2003-90226

DISCLOSURE OF THE INVENTION

PROBLEMS TO BE SOLVED BY THE INVENTION

[0008]

The present invention has been made to solve the above problems, and an object of the present invention is to provide a marine vessel information processing method and a marine vessel information processing device allowing in-vessel information processing systems and a land-side information processing system to display the integration of navigation data and engine data based on common data by using single integrated software rather than software dedicated respectively to devices and the like such as navigation devices and engines; and thereby enabling remote monitoring of a plurality of managing-target vessels.

MEANS FOR SOLVING THE PROBLEMS

[0009]

To achieve the above objects, a marine vessel information

processing method according to the present invention is characterized by including: automatically collecting and storing, in an in-vessel server, navigation data and engine data from marine vessel equipment through an in-vessel LAN system; displaying integration of the navigation data and the engine data on an in-vessel computer installed on the in-vessel LAN system; transferring the navigation data and the engine data stored in the in-vessel server to a portal server through a satellite communication system and storing these data in the portal server; causing a managing server computer to acquire the navigation data and the engine data stored in the portal server through the Internet; and displaying the integration of the navigation data and the engine data on the managing server computer. The displaying the integration of the navigation data and the engine data herein means displaying, on a single display, the navigation data outputted by various devices and the engine data on devices such as a main engine and an auxiliary engine while temporally synchronizing these data.

[0010]

This method allows not only the in-vessel computer to display the integration of vessel operation data consisting of the navigation data and the engine data, but also the land-side computer to display this integration through the vessel-land satellite communication system and the Internet network. Thus, the land-side computer can perform remote monitoring of the vessel operation data. This enables land-based offices to perform comprehensive management of these operation data. Thereby, operation management can be improved in efficiency and ensures its punctuality, and thus an operation management can be enhanced to ensure security and safety.

[0011]

Additionally, in the above marine vessel information processing method, equipment connected to the in-vessel LAN system may be controlled by causing the managing server computer to create control data on the basis of the navigation data and the engine data, and by transmitting the control data to the in-vessel computer through the Internet and the satellite communication system. This allows land-based offices to provide proper and timely vessel-operation support to vessels in passage.

[0012]

Additionally, the above marine vessel information processing method may be characterized in that the navigation data includes data acquired in real time from an electronic chart display and information system and either a voyage data recorder or a simplified voyage data recorder, and the engine data includes data acquired in real time from a data logger recording operation data on a main engine and an auxiliary engine.

[0013]

The electronic chart display and information system is a navigation aid system called an ECDIS. The ECDIS collectively displays, on a single display, information outputted from navigation devices which have been individually used so far, such as a gyroscope, a global positioning system (GPS), radar, automatic radar plotting aids (ARPA), an automatic identification system (AIS) and an automatic navigation warning receiver (NAVTEX). Moreover, the electronic chart display and information system analyzes information on its own vessel by using position information and a digital chart as well as

automatically controls an autopilot when connected to the autopilot.

[0014]

The voyage data recorder is a data recorder called VDR. The VDR records data related to navigation of a vessel and sound related to vessel handling in order to allow investigation of the causes of a marine accident due to human error and development of measures to prevent a recurrence of such an accident, and corresponds to a flight recorder and a voice recorder in an aircraft. Meanwhile, the simplified voyage data recorder, which is called S-VDR, is a simplified model of the voyage data recorder (VDR).

[0015]

To achieve the above objects, a marine vessel information processing device according to the present invention is configured by including an in-vessel information processing system and a land-side information processing system. The in-vessel information processing system automatically collects and stores, in an in-vessel server, navigation data and engine data from marine vessel equipment through an in-vessel LAN system; transfers the navigation data and the engine data stored in the in-vessel server to a land-based portal server through a satellite communication system; and displays integration of the navigation data and the engine data on an in-vessel computer installed on the in-vessel LAN system. The land-side information processing system causes a managing server computer to acquire the navigation data and the engine data stored in the portal server through the Internet; and displays the integration of the navigation data and the engine data on the managing server computer.

[0016]

Additionally, the above marine vessel information processing device is configured by causing the managing server computer of the land-side information processing system to create control data on the basis of the navigation data and the engine data, and to transmit the control data to the in-vessel computer of the in-vessel information processing system through the Internet and the satellite communication system; and thereby controlling equipment connected to the in-vessel LAN system

[0017]

Additionally, the above marine vessel information processing device may be configured such that the navigation data includes data acquired in real time from an electronic chart display and information system and either a voyage data recorder or a simplified voyage data recorder, and that the engine data includes data acquired in real time from a data logger recording operation data on a main engine and an auxiliary engine.

[0018]

The above configuration makes it possible to perform the above marine vessel information processing method and to provide similar effects.

EFFECTS OF THE INVENTION

[0019]

The marine vessel information processing method and the marine vessel information processing device according to the present invention allow in-vessel information processing systems and a land-side information processing system to display the integration of the navigation data and the engine data based on common data stored in a portal server by using

single integrated software rather than software dedicated respectively to devices and the like such as navigation devices and engines. This allows a land-side information processing system to perform remote monitoring of each of multiple managing-target vessels. In addition, each land-side computer in the land-side information processing system can comprehensively analyze operation data of each of these multiple vessels, and can perform operational management of these multiple managing-target vessels on the basis of the analysis and the like.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020]

[Fig. 1] Fig. 1 shows a configuration of a marine vessel information processing device according to an embodiment of the present invention.

[Fig. 2] Fig. 2 shows a configuration of a "Login Window" screen.

[Fig. 3] Fig. 3 shows a configuration of a "Fleet Monitor Menu" screen.

[Fig. 4] Fig. 4 shows a configuration of a "Ship's Position" screen.

[Fig. 5] Fig. 5 shows a configuration of an "Engine-side Operation Panel (MIMIC)" screen.

[Fig. 6] Fig. 6 shows a configuration of a "Main Engine Running Data (M/E Running Data)" screen.

[Fig. 7] Fig. 7 shows a configuration of a "Data Logger" screen.

[Fig. 8] Fig. 8 shows a configuration of a "Warning List" screen.

[Fig. 9] Fig. 9 shows a configuration of a "Data Export"

screen.

[Fig. 10] Fig. 10 shows a configuration of a "Ship's Status" screen.

EXPLANATION OF REFERENCE NUMERALS

[0021]

- 1 marine vessel information processing device
- 10 in-vessel information processing system
- 11 in-vessel computer
- 20 land-side information processing system
- 21 base station
- 22 portal server
- 23 managing server computer
- 30 in-vessel LAN system
- 40 satellite communication system
- 50 the Internet
- S11 data collecting and storing means
- S12 vessel-side data display means
- S13 control means
- S14 vessel-side transmitting and receiving means
- S22 data collecting and managing means
- S21 land-side transmitting and receiving means
- S22 data collecting and managing means
- S23 data access means
- S24 land-side data display means
- S25 control means

BEST MODE FOR CARRYING OUT THE INVENTION

[0022]

Hereinafter, description will be given of an embodiment of a marine vessel information processing method and a marine vessel information processing device according to the present

invention, with reference to the drawings.

[0023]

Firstly, a marine vessel information processing device 1 of the embodiment of the present invention will be described. As shown in Fig. 1, the marine vessel information processing device 1 is configured by including in-vessel information processing systems 10 and a land-side information processing system 20.

[0024]

Each in-vessel information processing system 10 is configured by including data collecting and storing means S11, vessel-side data display means S12, control means S13 and vessel-side transmitting and receiving means S14. The in-vessel information processing systems 10 are installed in multiple managing-target vessels, respectively.

[0025]

The data collecting and storing means S11 is means for automatically collecting navigation data and engine data from marine vessel equipment and storing the data in an in-vessel server through an in-vessel LAN system 30. The navigation data includes data acquired from an electronic chart display and information system (EDCIS) and a voyage data recorder (VDR) or a simplified voyage data recorder (S-VDR) in real time.

[0026]

The electronic chart display and information system (EDCIS) is a navigation aid system. The electronic chart display and information system collectively displays, on a single display, information outputted from navigation devices such as a gyroscope for detecting an orientation, a global positioning system (GPS) for detecting position of a vessel,

a radar, automatic radar plotting aids (ARPA), an automatic identification system (AIS) and an automatic navigation warning receiver (NAVTEX: navigation telex). The gyroscope detects an orientation. The global positioning system detects position. The automatic radar plotting aids is a system that automatically carries out radar plotting. The automatic identification system automatically transmits information such as an identification code, a position, a course and a speed of its own vessel, and automatically receives such information from another vessel. The automatic navigation warning receiver automatically receives maritime safety information from coast stations and prints the information with a built-in printer. Moreover, the electronic chart display and information system analyzes information on its own vessel by using position information and a digital chart as well as automatically controls an autopilot when connected to the autopilot.

[0027]

The voyage data recorder (VDR) is a data recorder that records data related to navigation of a vessel and sound related to vessel handling in order to allow investigation of the causes of a marine accident due to human error and development of measures to prevent a recurrence of such an accident. The voyage data recorder corresponds to a flight recorder and a voice recorder in an aircraft. Meanwhile, the simplified voyage data recorder (S-VDR) is a simplified model of the voyage data recorder (VDR).

[0028]

These devices are supplied by different vendors and thus output data sets in different data formats, respectively. Accordingly, the data collecting and storing means S11 is

configured to provide data conversion tables for these different-format data sets in order to standardize the data sets respectively outputted from these devices in acquiring them from these devices, and thus to collectively handle the data sets in a single database. Similarly, in screen displaying, a screen (MIMIC screen) for a standard engine-side operation panel is created since a different vendor employs different display software. This allows display of the integration of data sets stored in the single database while temporally synchronizing the navigation data sets respectively outputted from the various devices with engine data sets outputted from devices such as a main engine and an auxiliary engine. Moreover, this configuration eliminates the need for preparation of different display software for each vendor of a data logger, a VDR or an ECDIS.

[0029]

The vessel-side data display means S12 is means for displaying, on an in-vessel computer 11 installed on the in-vessel LAN system 30, the integration of the navigation data and the engine data. The control means S13 is means for controlling various in-vessel devices. The vessel-side transmitting and receiving means S14 is means for transferring, through a satellite communication system 40 to a data collecting and managing means S22, operation data consisting of navigation data and engine data stored in the in-vessel server. The data collecting and managing means S2 is formed of a land-side portal server 22. The vessel-side transmitting and receiving means S14 is also means for receiving control data from the land-side information processing system 20.

[0030]

The land-side information processing system 20 is configured by including land-side transmitting and receiving means S21 formed of a base station 21, the data collecting and managing means S22 formed of the portal server 22, data access means S23, land-side data display means S24 and control means S25. Typically, the land-side information processing system 20 includes a single base station 21 as the land-side transmitting and receiving means S21 and a single portal server 22 as the data collecting and managing means S22. Meanwhile, managing server computers 23 are installed as many as entities that manage managing-target vessels by using the marine vessel information processing device 1. Each managing server computer 23 has the data access means S23, the land-side data display means S24 and the control means S25.

[0031]

The land-side transmitting and receiving means S21, which is formed of the land-based base station 21, is means for receiving the navigation data and the engine data transferred by the vessel-side transmitting and receiving means S14 of each in-vessel information processing system 10 through the satellite communication system 30 such as the INMARSAT (international mobile satellite organization) satellite communication system. In addition, the land-side transmitting and receiving means S21 is also means for transmitting, to the vessel-side transmitting and receiving means S14, the control data created based on the navigation data and the engine data by the control means S25 of the land-side information processing system 20.

[0032]

The data collecting and managing means S22 storing

therein operation data transferred from the vessel-side transmitting and receiving means S14 through the land-side transmitting and receiving means S21. The data collecting and managing means S22 is formed of the portal server 22 for delivering the operation data. The data collecting and managing means S22 accumulates and stores therein data on each vessel such as navigation data, engine data and control data and provides this data to the land-side managing server computers and the in-vessel computers. Typically, the data collecting and managing means S22 is provided in a land-based facility such as a data management company or a vessel operation control company.

[0033]

Meanwhile, the data access means S23, the land-side data display means S24 and the control means S25 are provided in the managing server computer 23 of each vessel management company or each in-vessel device management company. The data access means S23 is means for accessing data in the portal server 22 serving as the data collecting and managing means S22 through the Internet 50, and may be standard Internet connection means.

[0034]

Meanwhile, the land-side data display means S24 is means for displaying, on the corresponding managing server computer 23 provided in a facility such as a vessel management company, the integration of the navigation data and the engine data acquired by accessing the portal server 22, which serves as the data collecting and managing means S22. The land-side data display means S24 is formed by including approximately the same software as the vessel-side data display means S12 of each in-vessel information processing system 10. The land-side

data display means S24 is configured to be capable of displaying data on a Web browser on a computer in the same uniform format as employed in each in-vessel computer 11. The control means S25 is means for creating control data for controlling various marine vessel equipments from the navigation data and the engine data.

[0035]

Next, description will be given of a marine vessel information processing method. In the marine vessel information processing method, each in-vessel information processing system 10 regularly and automatically collects navigation data and engine data from its own marine vessel equipment and stores the collected data in its own in-vessel server. Specifically, the data collecting and storing means S11 performs the above data storage by storing the data, through the in-vessel LAN system 30, in the in-vessel server placed as part of the in-vessel computer 11 or a separate unit. In addition, the vessel-side transmitting and receiving means S14 transmits the navigation data and the engine data stored in the in-vessel server, to the land-side transmitting and receiving means S21 of the land-side information processing system 20 through the satellite communication system 40. The data stored in the in-vessel server includes only data on its own vessel. Regarding the data, old one is updated as necessary in consideration of memory capacity of the in-vessel server and the like.

[0036]

Additionally, the vessel-side data display means S12 displays, on a display screen of the in-vessel computer 11 installed in the in-vessel LAN system 30, the integration of

the navigation data and the engine data. Crews of the vessel look at the navigation data, the engine data and the control data constituting the integrated display data, and thus operate and control devices such as navigation devices and engines. The navigation data and the engine data are collected by the in-vessel LAN system 30, while the control data is transmitted from the land-side information processing system 20.

[0037]

On the other hand, in the land-side information processing system 20, the land-side transmitting and receiving means 21, receives the navigation data and the engine data stored in each in-vessel server through the satellite communication system 40. Upon receipt of the data, the land-side transmitting and receiving means S21 transfers the data to the portal server 22 of the data collecting and managing means S22 through the Internet 50. The data collecting and managing means S22 is provided in a facility such as a data management company or a vessel operation control company. The data collecting and managing means S22 collects and manages the navigation data and the engine data as data on the vessel. The data collecting and managing means S22 collects and manages data not on just one vessel but on the multiple managing-target vessels. In response to data access by the managing server computer 23 of a user such as a vessel operation control company or a device management company, the data collecting and managing means S22 provides the accessed data. The method may be configured to transmit emergency data not through the portal server 22 but directly from the land-side transmitting and receiving means S21 to the managing server computers 23 in parallel.

[0038]

Moreover, a normal data acquisition method does not allow effective response to a case requiring more detailed mesh data in an emergency in a vessel. In order to address such a case, the method may be configured as follows. Specifically, settings to acquire optimal data are created respectively for different cases in emergencies in advance. Each setting is enabled by a simple operation of the in-vessel computer 11 in a vessel in emergency, or a remote operation of any of the land-based managing server computers 23, and this causes the land-based managing server computer 23 to transmit necessary data. This allows remote perception of a status of the vessel to cause the vendors to propose necessary measures.

[0039]

In the managing server computer 23 provided in each of facilities such as vessel operation control companies or device management companies, the data access means S23 accesses and acquires the navigation data and the engine data in the data collecting and managing means S22, as necessary. Then, the land-side data display means S24 displays the integration of the navigation data and the engine data.

[0040]

In addition, the control means S25 of the managing server computer 23 compares the navigation data and the engine data with the existing control data, and thereby creates new control data. The new data is created automatically or manually by a land-side control clerk looking at the acquired data.

[0041]

The newly created data is transmitted to the land-side transmitting and receiving means S21 through the Internet 50

and the satellite communication system 40. The land-side transmitting and receiving means S21 transmits the received data to the vessel-side transmitting and receiving means S11 of the in-vessel information processing system 10 of the concerned vessel. Simultaneously, the data is transmitted to the portal server 22 through the Internet 50, and thereby collected and stored in the portal server 22. Note that the method may be configured such that the data is transmitted to the vessel-side transmitting and receiving means S11 through the portal server 22.

[0042]

Then, in the in-vessel information processing system 10, the vessel-side data display means 13 displays, on the display screen of the in-vessel computer 11, the new control data that the vessel-side transmitting and receiving means S11 receives. Upon looking at the control data displayed by the vessel-side data display means 13, a vessel crew manually or automatically controls the vessel navigation and equipment or reflects the data to his/her management. Note that vessel crews input control data as necessary, and the control means 14 controls the in-vehicle equipment on the basis of the new control data inputted as above.

[0043]

In this marine vessel information processing device 1, the data used in the marine vessel information processing device 1, such as the navigation data, the engine data and the control data is screened according to a preset criterion to be collected and stored in the portal server 22. The portal server 22 serves as an information sharing platform, and is used as a base for providing a general information related to vessel operation.

[0044]

Next, more detailed description will be given of configurations of each in-vessel information processing system 10 and the land-side information processing system 20 in relation to operations of each in-vessel computer 11 and each managing server computer 22.

[0045]

In the marine vessel information processing device 1, a Web site address to access the portal server 22 hosting the database is acquired, and the Web site is given a name (here, assumed to be "Fleet Monitor"). In addition, for each in-vessel computer 11 and each managing server computer 22, a mail address is acquired and registered in the marine vessel information processing device 1.

[0046]

Then, a name (here, assumed to be "Fleet A/Tanker") is given to a fleet consisting of managing-target vessels each equipped with the in-vessel side information processing system 10, and registered in the marine vessel information processing device 1. In addition, for the fleet or each vessel registered as above, various thresholds (such as minimum level, maximum level and average level thresholds), which are manager-side (user-side) control data, are set. The thus-set thresholds are inputted to the control means S25 of the land-side information processing system 20 and transmitted to the portal server 22 to be stored therein.

[0047]

Suppose the case where the portal server 22 receives data such as data not satisfying the thresholds set by the manager or data indicating occurrence of an engine data logger alarm

from any of the in-vessel computers 11 of the managing-target vessels. The portal server 22 is configured to automatically transmit a warning mail to each of the registered user mail addresses, that is, to each in-vessel computer 11 and each managing server computer 23, in this case.

[0048]

Upon receipt of the warning mail, each in-vessel computer 11 and each managing server computer 23 respectively alert the vessel crews and the land-side managers by causing the contents of the warning mail to pop up on the screen in real time and by, when needed, making a warning sound. Note that the display screen is configured to allow crews and managers to understand managing-target data on the managing-target vessels only by reading through the displayed warning mail. The managing-target data includes abnormality in the number of revolutions of the main engine and occurrence of an engine data logger alarm.

[0049]

Next, description will be given of the case where the in-vessel computer 11 of each in-vessel information processing system 10 and each managing server computer 23 of the land-side information processing system 20 uses the marine vessel information processing device 1. In this case, a user accesses the address of the Web site "Fleet Monitor" by using general-purpose browser software such as Internet Explorer through the in-vessel LAN system 30, the satellite communication system 40, the Internet 50 and/or the like. In the example shown in Fig. 2, the user firstly enters a Web site "Maritime Solution (Maritime-SOL)," and then enters the Web site "Fleet Monitor."

[0050]

Each of the in-vessel computers 11 and the managing server computers 23 is configured to display, on the screen, a "Login Window" for the "Maritime Solution (Maritime-SOL)" as shown in Fig. 2, in response to the above access. Thereby, the user is allowed to enter the "Fleet Monitor" when firstly logging in the "Maritime-SOL" by filling in fields of "Company Identification Number (COMPANY ID)," "User Identification Number (USER ID)" and "PASSWORD," and then selecting a "Fleet Management."

[0051]

The "Maritime-SOL" is configured to display, on the screen, a world chart at the upper left, a list of vessels (Ship List) at the lower left and a chart at the right, when the user pulls down a "Ship Group" at the upper left of the "Fleet Monitor Menu" screen shown in Fig. 3 and clicks on the "Select" button for a managing-target fleet ("Fleet A/Tanker," for example). In addition, the "Maritime-SOL" displays, on the chart, the positions of the respective vessels belonging to the selected fleet. Moreover, the "Maritime-SOL" is configured to check a status of each of the displayed vessel and to display a symbol indicating the vessel's position on the chart and the vessel's name in the list in a color corresponding to the status. Specifically, the symbol and the name is displayed in yellow if the vessel is in a normal status, while displayed in red if the vessel is in an abnormal status such as when an engine data logger alarm occurs in the vessel .

[0052]

Meanwhile, regarding vessel selection, the "Maritime-SOL" is configured to extract a vessel when the

vessel's position on the chart or the vessel's name in the vessel list is selected. This facilitates selection of the managing-target fleet. In addition, the "Maritime-SOL" is configured to extract the managing-target vessels existing in an area and display the list of the extracted vessels and the vessels' positions in the right chart, when the area is selected in the world chart. This allows extraction of the managing-target vessels existing in a particular sea area such as a dangerous sea area, for example, rather than extraction of vessels of each fleet.

[0053]

Additionally, the "Maritime-SOL" is configured to display a pop-up screen of detailed data on the red vessel, when the vessel whose position symbol on the chart and whose vessel's name in the list are displayed in red, is selected. The detailed data includes "Last Data Measuring Date And Time" and "Ship's Position." This display allows the detailed data on such a vessel to be checked. On the other hand, the "Maritime-SOL" is configured to jump to a screen of individual detailed information on the blue vessel, when the vessel displayed in blue is selected.

[0054]

The screen of individual detailed information on each vessel is configured by being provided with tags of "Ship's Position," "Engine-side Operation Panel (MIMIC)," "Main Engine Running Data (M/E Running Data)," "VDR," "Data Logger," "Warning List," "Data Import History," "Data Export" and "Ship's Status," as shown in Fig. 4 where the "Ship's Position" tag is opened. In addition, the screen is configured to display a position, a speed, a course and a bow orientation of the vessel

on a chart as shown in Fig. 4, when the "Ship's Position" tag is selected. Moreover, the "Ship's Position" screen is configured such that a display scale of the chart can be changed in accordance with selection. This allows an operational status of each vessel to be checked. For example, Fig. 4 shows the current status of being in Osaka port, and thus shows the vessel speed as 0.

[0055]

In addition, the "Ship's Position" screen is configured to display a track of the vessel so as to allow a time-series change (trend) to be checked. For example, as the case of checking the history for past three days, it is assumed that "2005-11-20" and "2005-11-23" are respectively entered in Start Date and End Date of the interval in a "Display Ship Track" on the right of the screen, and that a "Display" button located by these fields is then clicked on. The "Ship's Position" screen is configured to display the vessel track in this interval in light blue in response to the above operation. Additionally, the "Ship's Position" screen may be configured to display a line indicating a route of a navigation plan in white, and this allows comparison between the vessel track and the navigation plan.

[0056]

Moreover, the "Ship's Position" screen is configured to: jump to a screen for superimposed data selection if the "Setting" button at the upper right of the screen is clicked on; if check boxes respectively corresponding to one or more of the data sets are filled with check marks, select the data sets; and return to the previous screen so as to display the selected data sets to be superimposed on the screen if the "Set"

button is clicked on. This superimposed display of data on weather and marine phenomena at the time of an accident and a navigation plan on the chart can contribute to accident investigation and the like.

[0057]

In addition, the "Ship's Position" screen is configured to be capable of displaying past data corresponding to a predetermined time interval (an hour, for example) by using a playback function shown in the lower right of the screen. The "Ship's Position" screen is configured to display a status at a certain past time point when a date is entered and a "Play" button is clicked on, and to playback and fast-forward the data respectively when "Fast-rewind" and "Fast-forward" buttons are clicked on. Moreover, the "Ship's Position" screen may be configured to, for example, fast-forward the data till reaching a future part of the data when there is a navigation plan data. This allows the marine vessel information processing device 1 to support data on what lies after the measuring date and time. In this case, forecast data purchased from the Japan Weather Association four times a day is used as the data on weather and marine phenomena.

[0058]

The screen of individual detailed information is configured to jump to the screen shown in Fig. 5, when the "engine-side operation panel (MIMIC)" tag is selected. As shown in Fig. 5, Main Engine (M/E), Electric Generator (D/G), Steam Line and the like can be selected from a pull-down menu at the upper-left of the screen, and the screen is switched to display the selected information if a "Select" button is clicked on. In addition, the "MIMIC" screen is configured such that

the data displayed on the screen can be selected from instantaneous values (acquired at each fixed time), average values (per an hour), maximum values (in an hour), minimum values (in an hour) and the like. Note that this function is provided with a playback function.

[0059]

When the "Main Engine Running Data (M/E Running Data)" tag is selected, the screen shown at the left of Fig. 6 is displayed. In the screen, reference lines respectively for the number of main engine (M/E) revolutions and a shaft horsepower are displayed, and the current status is plotted and displayed on the reference lines. The "M/E Running Data" screen is configured to allow a user to create and input the reference lines by using another setting menu. The "M/E Running Data" screen may be provided with a function to superimpose past data placed at the right of the screen, and thus configured to plot the past data in blue when "2005-11-20" and "2005-11-23" are respectively entered in Start Date and End Date of the plot interval and a "Display" button is then clicked on. This allows perception of a change trend in addition to the current status. Additionally, the "M/E Running Data" screen may be configured to allow selection of "Propeller Slip," "Log Speed" and the like. No reference line is displayed for these two items, but approximately the same function is provided to the screen for the items. The "M/E Running Data" screen is configured to allow selection of any of these items from a pull-down menu at the upper-left of the screen, and to jump to the screen displaying the selected item when a "Select" button is clicked on.

[0060]

The screen of individual detailed information is

configured to display data outputted from the voyage data recorder in approximately the same manner as above when the "VDR" tag is selected, though not shown.

[0061]

When the "Data Logger" tag is selected, the number of revolutions of the main engine is displayed in the uppermost row of the list, and a graph field is displayed at the rightmost in the table, as shown in Fig. 7. This allows the checking of a revolution trend of the main engine. In addition, the "Data Logger" screen is configured to pop up a separate window showing a trend graph with time and speed respectively on horizontal and vertical axes, when an icon imitating a trend is clicked on. In the view at the right of Fig. 7, red horizontal lines respectively drawn at 70 and 100 revolutions show user-defined thresholds, and a curve shows measured values. As is shown by this right view of Fig. 7, some measured values fall below the minimum level. Note that, the "Data Logger" screen is configured to allow display selection from a bar graph, a meter, a compass and the like in addition to the trend graph.

[0062]

In addition, the "Data Logger" screen is configured to include a function to individually display any recorded data sets in addition to "M/E Revolution". This enables individual display of attention-requiring various data sets. In the view at the left of Fig. 7, nine data sets are displayed as selectable data. To allow simple switching among these data sets, the "Data Logger" screen is configured as follows. When a "Data Select" button at the upper left of the screen is clicked on, a setting screen (not shown) is displayed. When a recording device item and thereafter whether "Add" or "Delete" are

selected on the setting screen, and a "Display" button is registered on the setting screen, the "Data Logger" screen with this setting reflected thereon is displayed again. In addition, the "Data Logger" screen is configured such that, when a "Save" button at the upper right of the setting screen is clicked on, the display setting for this user identification number is registered in the marine vessel information processing device 1. The display setting is maintained when the user logs on to the marine vessel information processing device 1 after that time.

[0063]

The screen of individual detailed information is configured to jump to the screen shown in Fig. 8, when the "Warning List" tag is selected. As shown in Fig. 8, when "2005-1-20" ~ "2005-11-23," for example, is inputted in Interval representing a target interval for history search at the upper left of the screen, a warning history in the target interval is listed up. This allows checking of the warning history. For example, phenomena such as abnormality in the number of revolutions of the main engine are found to occur in Fig. 8. In addition, the "Warning List" screen is configured to extract either engine data logger alarms, abnormal status not satisfying user-defined thresholds or all the alarms, when an item tag shown in Log Type is selected.

[0064]

The screen of individual detailed information is configured to display information such as the data of reception date/time, the data of measuring date/time and the like, from the in-vessel computer 11 of the concerned vessel, when the "Data Import History" tag is selected. This allows checking

of data stored in the portal server 22.

[0065]

The screen of individual detailed information is configured to jump to the screen shown in Fig. 9, when the "Data Export" tag is selected. When a data item to export and an interval are inputted, the corresponding recorded data can be downloaded outside the marine vessel information processing device 1 as a text file. This allows data recorded in the marine vessel information processing device 1 of the concerned vessel to be moved to a separate system or the like, when the data needs analyzing with the separate system.

[0066]

The screen of individual detailed information is configured to display data outputted from the electronic chart display and information system (ECDIS) as shown in Fig. 10, when the "Ship's Status" tag is selected. This allows checking of an estimated time of arrival (ETA) for repairs, unloading or the like.

[0067]

Additionally, the "Maritime-SOL" is configured to jump to a menu for setting up a fleet, a threshold and a warning mail (threshold), when the "User Setup" tag is selected in a menu located at the top of the "Fleet Monitor" screen. Moreover, the "Maritime-SOL" is configured to jump to a menu for setting up a reference line related to the main engine (M/E), and warning mails such as an engine data logger alarm, when the "Master Management" tag is selected. Since data such as test operation data at the completion of the corresponding vessel is to be inputted during this setting, the setting screen is displayed while confidentiality of such data is maintained.

[0068]

Moreover, the above marine vessel information processing device 1 is also provided with the following functions such as a health check function, a manual entry function and an abstract-log/noon-report management function.

[0069]

To allow monitoring whether or not each in-vessel information processing system 10 is operating normally, the marine vessel information processing device 1 is configured by including, as the health check function, a function to record operation status in each step of its program and to report, to a system manager, data on the operation status together with data collected by the in-vessel information processing system 10. Specifically, the report to the system manager is performed by transmitting these data to the corresponding managing server computer 23 of the land-side information processing system 20. Note that, to prevent data update failure in providing the service, the marine vessel information processing device 1 is configured by further including a function to transmit warnings for notifying the managing server computers 23 of abnormality, when the above marine vessel information processing device 1 fails to receive data from each in-vessel information processing system 10 or data from a weather and marine phenomena information provider, for more than a predetermined period.

[0070]

Additionally, the marine vessel information processing device 1 is configured by including, as the manual entry function and the abstract-log/noon-report management function, functions to create and manage an abstract log and a noon report, both of which are indispensable for vessel management. Data

necessary to create each abstract log and each noon report consists of: data collected and held by each in-vessel information processing system 10; and supplemental data additionally inputted by vessel crews.

[0071]

Data collected and held by each in-vessel information processing system 10 is automatically transferred in a fixed form and displayed on a screen. Vessel crews input supplemental data and modify the automatically transferred data through this screen. The abstract log and the noon report are created from these data, and transmitted to and stored in the land-side information processing system 20 together with data collected by the in-vessel information processing system 10. In addition, the land-side information processing system 20 is configured by including a function to allow each land-based service user to browse and aggregate the stored abstract logs and noon reports on the corresponding managing server computer 23. As described above, the land-based service users include a data management company, a vessel operation control company and a device management company.

[0072]

Moreover, the marine vessel information processing device 1 may be configured by: being provided with, as an extended manual entry function, a function to allow modification of data collected by the in-vessel information processing system 10; and including a function to store the modification history together with the pre-modification data. The function is used for correcting measurement errors due to aged deterioration of measurement instruments installed on each vessel, such as a temperature sensor.

[0073]

Meanwhile, regarding images and sounds, each in-vessel information processing system 10 is configured to collect radar images collected in the voyage data recorder, bridge sounds and VHF communication sounds, and to transmit these images and sounds to the land-side information processing system 20. In the existing INMARSAT communication, the cost of image or sound data communication is very expensive because of its file size. Accordingly, the marine vessel information processing device 1 is provided with a function to allow each land-based service user to acquire data that the user desires to receive when the user needs image or sound data due to reasons such as abnormal status occurrence. Specifically, the land-based service user acquires the desired data by issuing an instruction to the in-vessel information processing system 10 through the land-side information processing system 20. Note that, the marine vessel information processing device 1 is configured to allow each in-vessel user to issue such an instruction from the corresponding in-vessel information processing system 10, as well. In addition, the marine vessel information processing device 1 is configured such that image and sound data captured by cameras installed on each vessel can be collected in the corresponding in-vessel information processing system 10 and handled as above.

[0074]

Regarding weather and marine phenomena data, the land-side information processing system 20 is configured by including a function to transmit, to a vessel, part or the whole of the weather and marine phenomena data held in the land-side information processing system 20 in response to a request from

the corresponding in-vessel computer 11 or any of the land-side managing server computers 23. This allows a vessel-side user to develop or modify a navigation plan while referring to the weather and marine phenomena data, as well.

[0075]

Meanwhile, regarding the automatic identification system, each in-vessel information processing system 10 is configured to collect data from the automatic identification system, too, and to store and use this collected data as similar to the engine data collected from the data logger and the navigation data collected from either the voyage data recorder or the simplified voyage data recorder.

[0076]

Hence, the above marine vessel information processing method and the above marine vessel information processing device 1 enable the following operations. Specifically, as basic information related to operation of each vessel, various data for operation, maintenance and management of the vessel including "navigation data (marine traffic data)" and "engine data (engine operation data)" can be collected and managed in the portal server 22 on the Internet 50. In addition, the integration of such data can be displayed not only on the in-vessel computer 11 of each vessel but also on the managing server computer 23 of each land-based office.

[0077]

This allows each land-side computer 23 to display, through a Web browser, operation management data on multiple vessels as the integration of the navigation data and the engine data and furthermore in the same uniform format as employed in each in-vessel computer 11.

[0078]

In addition, the in-vessel computers 11 on the respective managing-target vessels and the portal server 22 and the land-side computers 23 are connected to one another through the Web-based in-vessel LAN systems 30 on these vessels, the satellite communication system 40 and the Internet 50. Accordingly, through these vessel-land communication lines, various data for operation, maintenance, management and the like of the vessels can be collected and stored in the portal server 22.

[0079]

Moreover, the data stored in the portal server 22 can be provided to concerned parties through the Internet 50. This allows real-time data showing operation status of managing-target vessels to be browsed and used in a screen layout according to an intended use at any of various places all over the world, and thereby enables vessel-land information sharing.

[0080]

Additionally, since data on each vessel is automatically collected and transmitted to the land-side information processing system 20 in accordance with the users' demand, operational loads of vessel crews can be reduced. In addition, the above marine vessel information processing method and the above marine vessel information processing device 1 allows each user to set his/her own thresholds and has a function to issue a warning to the user when data not satisfying these thresholds occurs. This can improve efficiency in work of a supervisor operating each land-side computer 23 and consequently also improve reliability of the work. Moreover, the marine vessel

information processing device 1 can be easily used in combination with a separate device analysis system, and this combined use enables more accurate analysis for a performance diagnosis and a remaining life diagnosis of a main engine.

[0081]

This allows land-based offices to provide proper and timely vessel-operation support. In addition, since the present invention implements the remote monitoring of active vessels among three countries, each supervisor can visit his/her managing-target vessels at the optimal timings depending on status of these vessels. This will leads to reduction in the supervisor's waiting time and thus to cost reduction.

[0082]

In other words, the above marine vessel information processing device 1 enables land-based offices to monitor data on managing-target vessels such as navigation data and engine data through the satellite communication system 40, the Internet 50 and the portal server 22. Unlike monitoring services currently provided by several companies and displaying only navigation data (data on vessels' positions and weather and marine phenomena), the marine vessel information processing device 1 enables monitoring of operation data on in-vessel devices as typified by main engines concurrently with navigation data. In addition, the marine vessel information processing device 1 enables consolidate management of vessels constituting any fleet.

[0083]

Next, description will be given of different benefits of the use of the above marine vessel information processing device

1 to different entities of: vessel owners, vessel managers, device vendors and shipyards. Regarding the benefits to each vessel owner, approximately real-time perception of operation status of vessels allows the vessel owner to speed up report preparation for shippers and planning of vessel allocation. Consequently, the vessel owner can achieve efficiency improvement in operation management and cost reduction.

[0084]

Regarding the benefits to each vessel manager, remote monitoring of status of main engines, electric generators and auxiliary engines allows the vessel manager to timely provide operation support to navigation sections and engine sections and to perform accident analyses more accurately and speedy. Accordingly, the vessel manager can ensure punctuality and can provide more reliable security and safety.

[0085]

Meanwhile, regarding the benefits to each device vendor, remote monitoring for state monitoring, a performance analysis and a remaining life diagnosis of devices provided by the device vendor and installed in a large number of vessels allow the device vendor to ensure punctuality and achieve cost reduction, and thus to readily improve reliability of the devices. As a result, the device vendor can manufacture and sell less fragile devices and thus improve its competitiveness.

[0086]

Moreover, regarding the benefits to each shipyard, state monitoring of vessels and their equipment and acquisition of various data allows the shipyard to appropriately prepare repair work and dock construction, and thus to ensure punctuality and achieve cost reduction.

[0087]

Moreover, the data collected and stored in the land-based portal server 22 may be not only browsed by users on vessels but also effectively used as follows. Specifically, an additional service to provide vessel management companies with advices from device vendors on the basis of the data will contribute to the vessel management companies' vessel management for the purposes of safety vessel operation, ensuring of punctuality and efficiency improvement. More specifically, each vendor may provide remote diagnosis tools such as a performance analysis tool and a remaining life diagnosis tool, and the tools may be installed on the portal server 22. This allows each vessel management company to readily give these diagnoses at any timing only by using the data in the portal server 22. By referring to the diagnosis result, the vessel management company can perform remote state monitoring of vessels in more detail and thus can optimize a vessel operation and service plan and a vessel maintenance plan for the above purposes. On the other hand, by providing tools to the portal server 22, each vendor can easily give remote diagnosis of its devices and thus can improve reliability thereof. Note that some vendor might not be able to provide tools because of its system concerns and the company policy. Even such a vendor can readily give vessel management companies remote diagnoses by allowing data download in a dedicated download file format so as to readily provide remote diagnoses by using a specific tool posted on a specific site.

INDUSTRIAL APPLICABILITY

[0088]

The aforementioned marine vessel information processing

method and the marine vessel information processing device which have beneficial effects according to the present invention can be extremely effectively used in a marine vessel information processing device required to efficiently create, transmit and store vast amounts of information in order to respond to strengthening of international security and environment rules.

CLAIMS

[1] A marine vessel information processing method, characterized by comprising:

automatically collecting and storing, in an in-vessel server, navigation data and engine data from marine vessel equipment through an in-vessel LAN system;

displaying integration of the navigation data and the engine data on an in-vessel computer installed on the in-vessel LAN system;

transferring the navigation data and the engine data stored in the in-vessel server to a portal server through a satellite communication system and storing these data in the portal server;

causing a managing server computer to acquire the navigation data and the engine data stored in the portal server through the Internet; and

displaying the integration of the navigation data and the engine data on the managing server computer.

[2] The marine vessel information processing method according to claim 1, characterized by further comprising

controlling equipment connected to the in-vessel LAN system

by causing the managing server computer to create control data on the basis of the navigation data and the engine data, and

by transmitting the control data to the in-vessel computer through the Internet and the satellite communication system.

[3] The marine vessel information processing method according to any one of claims 1 and 2, characterized in that

the navigation data includes data acquired in real time from an electronic chart display and information system and either a voyage data recorder or a simplified voyage data recorder, and

the engine data includes data acquired in real time from a data logger recording operation data on a main engine and an auxiliary engine.

[4] A marine vessel information processing device, characterized by comprising:

an in-vessel information processing system

automatically collecting and storing, in an in-vessel server, navigation data and engine data from marine vessel equipment through an in-vessel LAN system,

transferring the navigation data and the engine data stored in the in-vessel server to a land-based portal server through a satellite communication system, and

displaying integration of the navigation data and the engine data on an in-vessel computer installed on the in-vessel LAN system; and

a land-side information processing system

causing a managing server computer to acquire the navigation data and the engine data stored in the portal server through the Internet, and

displaying the integration of the navigation data and the engine data on the managing server computer.

[5] The marine vessel information processing device according to claim 4, wherein equipment connected to the in-vessel LAN system is controlled by causing the managing server computer of the land-side information processing system

to create control data on the basis of the

navigation data and the engine data, and

to transmit the control data to the in-vessel computer of the in-vessel information processing system through the Internet and the satellite communication system.

[6] The marine vessel information processing device according to any one of claims 4 and 5, wherein

the navigation data includes data acquired in real time from an electronic chart display and information system and either a voyage data recorder or a simplified voyage data recorder, and

the engine data includes data acquired in real time from a data logger recording operation data on a main engine and an auxiliary engine.