METHOD, SYSTEM, PROGRAM, DEVICE, AND RECORDING MEDIUM FOR CONSTRUCTION MANAGEMENT

BACKGROUND OF THE INVENTION

1. TECHNICAL FIELD

[0001] The technology of the present disclosure relates to a management technology for managing a construction plan and a progress status including, for example, regular repair work and inspection of an oil refining plant.

2. DESCRIPTION OF THE RELATED ART

[0002] Since regular repair work or preparation work necessary for the regular repair work in oil refining plant equipment including a heat exchange system is executed by stopping the operation of the plant, it is necessary to speed up the processing, and management for safety/security including construction progress, inspection after the regular repair, and the like is required.

[0003] Regarding progress management of maintenance inspection and the like, the following technique is known. A list creation unit that has received a list creation request selects maintenance inspection items in a confirmation item information database, creates a check list, and delivers the check list to a terminal device. Confirmation items such as maintenance inspection and measurement items performed according to this check list are taken into a server device through the terminal device, stored in the confirmation information database, and delivered to the terminal device according to a request (e.g., Patent Literature 1).

[0004] Regarding progress management of building work, the following technique is known. A construction plan support system, an inspection schedule database that accumulates data on inspection schedules, and an inspection schedule/result database that accumulates inspection progress data obtained by integrating the inspection schedules and records are provided. In the progress management, a progress confirmation system that transmits construction progress data obtained by converting an inspection progress status into a physical quantity of construction progress to the construction plan support system is combined, and section-classified processes and the previous construction progress data are integrated, to display a process chart with a chart progress line indicating the construction progress (e.g., Patent Literature 2).

CITATION LIST

PATENT LITERATURE

[0005] Patent Literature 1: JP 2004-227307 A

Patent Literature 2: JP 2010-282496 A

SUMMARY OF THE INVENTION

[0006] When carrying out regular repair work or machinery inspection in an oil refining plant, for example, in a case when the target is a heat exchange system of the plant, it is necessary to manage work tasks and work processes for a plurality of heat exchangers and a large number of related machinery each having different specifications. This management processing includes information sharing for allowing the owner side of the plant that orders the regular repair work and the inspection, a partner company that has received the work order, and their workers to grasp the construction plan and the progress status. The heat exchange system needs to be stopped for carrying out the regular repair work and inspection in the oil refining plant, and thus the management is required for reducing time loss between the processes and minimizing downtime. There is a problem in that the time loss due to the construction work and inspection lowers efficiency, tightens actual process time, and may cause deterioration in construction quality.

[0007] In addition, for the management of the regular repair work or inspection of machinery, management sheets are used, for example, for each management function such as processes, progress status, and construction quality, but since there are a large number of machinery, construction work, and inspection targets, a huge number of management sheets are required. In construction management, for each single process, it is required to input a status report of a corresponding task to a management sheet for each management function, and there is a problem in that enormous labor is required such as searching for a management sheet and grasping an input location for each sheet. There is a problem in that such labor-intensive construction management may cause errors due to manual work in searching for a sheet or in grasping an input location.

[0008] Regarding these problems, the configuration disclosed in Patent Literature 1 or Patent Literature 2 cannot provide a solution to the problem addressed by the present disclosure.

[0009] The inventors of the present disclosure have found that, regarding management of regular repair work of a heat exchange system and the like, it is possible to cause a worker or the like to easily grasp work information by causing information to be shared among a plurality of management functions on the basis of use of task information.

[0010] In view of the above problems and findings, an object of the present disclosure is to improve the efficiency and work quality of regular repair work, inspection, and the like.

[0011] In order to achieve the above object, one aspect of a construction management method of the present disclosure is a construction management method using a computer and including:

generating, by an information processing unit, a daily report associated with a plurality of task management tables including at least work task information, machinery information, and schedule information, the task management tables being generated for each management function using the common work task information; selecting, by the information processing unit, the machinery information by receiving selection information of the schedule information input to a first task management table, and extracting the work task information for each piece of the selected machinery information and reflecting the work task information in the daily report; and acquiring, by the information processing unit, record information associated with the schedule information and the machinery information from a second task management table to which execution information of a task including inspection has been input and reflecting the record information in the daily report.

[0012] The construction management method may further include presenting, to an information terminal, the daily report including one or both of the work task information extracted based on the schedule information and the machinery information, and the record information.

[0013] The construction management method may include: determining, by the information processing unit, a task progress status based on the schedule information and the record information; and presenting, by the information processing unit, set display information to an information presentation unit based on a determination result of the progress status.

[0014] The construction management method may include: setting, by the information processing unit, the work task information in task management tables and the daily report by reading the work task information from the task information tables recorded in a database; and setting the schedule information and the record information to be incapable of being input for the unselected task information based on task selection information input in association with the machinery information.

[0015] In order to achieve the above object, one aspect of a construction management system of the present disclosure includes: an information processing unit configured to generate a daily report associated with a plurality of task management tables including at least work task information, machinery information, and schedule information, the task management tables being generated for each management function using the common work task information, select the machinery information by receiving selection information of the schedule information input to a first task management table, extract the work task information for each piece of the selected machinery information, and reflect the work task information in the daily report, and acquire record information associated with the schedule information and the machinery information from a second task management table to which execution information of a task including inspection is input, and reflect the record information in the daily report; and an information terminal

including an information presentation unit configured to present the daily report including one or both of the work task information extracted based on the schedule information and the machinery information, and the record information.

[0016] In order to achieve the above object, one aspect of a program of the present disclosure is a program for causing a computer to execute: a function to generate a daily report associated with a plurality of task management tables including at least work task information, machinery information, and schedule information, the task management tables being generated for each management function using the common work task information; a function to select the machinery information by receiving selection information of the schedule information input to a first task management table, extract the work task information for each piece of the selected machinery information, and reflect the work task information in the daily report; and a function to acquire record information associated with the schedule information and the machinery information from a second task management table to which execution information of a task including inspection is input, and reflect the record information in the daily report.

[0017] The program may further cause the computer to execute a function to present, to an information terminal, the daily report including one or both of the work task information extracted based on the schedule information and the machinery information, and the record information.

[0018] The program may cause the computer to execute: a function to determine a task progress status based on the schedule information and the record information; and a function to present set display information to an information presentation unit on the basis of the determination result of the progress status.

[0019] The program may cause the computer to execute a function to read the work task information from task information tables recorded in a database, set the work task information in the task management tables and the daily report, and set the schedule information and the record information to be incapable of being input for the unselected work task information based on task selection information input in association with the machinery information.

[0020] In order to achieve the above object, one aspect of a construction management device of the present disclosure is a construction management device that manages construction work using a computer and includes: a device housing; and an information processing unit configured to generate a daily report associated with a plurality of task management tables including at least work task information, machinery information, and schedule information, the task management tables being generated for each management function using the common work task information, select the machinery information by receiving selection information of the schedule information input to a first task management table, extract the work task information for each piece of the

selected machinery information, and reflect the work task information in the daily report, and acquire record information associated with the schedule information and the machinery information from a second task management table to which execution information of a task including inspection is input, and reflect the record information in the daily report.

[0021] In order to achieve the above object, one aspect of a recording medium of the present disclosure is a recording medium storing any one, or two or more of the task management tables and the database included in the construction management method, the task management tables included in the construction management system, and the program.

[0022] According to the present disclosure, the following effects can be obtained.

[0023] (1) In the same machinery, the task management tables and the daily report are associated with each other on the basis of the common task information, and the schedule information and the record information input to these task management tables are automatically reflected in the daily report, so that it is possible to reduce the workload of searching for the information input location and checking the input target.

[0024] (2) For the specific machinery, since task information such as a construction plan and an inspection content, and the actual record information are collected in a daily report for the machinery of construction target, it is easy to grasp a series of information of construction work and inspection and the whole aspect of the construction work, and it is possible to reduce work loss by shortening the time of construction work and the like.

[0025] (3) By shortening the time required for the input work such as the regular repair work and the inspection result, it is possible to avoid human errors and improve work efficiency, resulting in work quality improvement.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] FIG. 1 is a diagram illustrating a configuration example of a construction management system according to one embodiment;

FIG. 2 is a diagram illustrating an example of a construction management function using a daily report and task management tables;

FIG. 3 is a diagram illustrating an example of a function to determine a task progress status involved by a construction management function unit;

FIGS. 4A and 4B are diagrams exemplifying that schedule information set in a task management table II is reflected in a daily report;

FIGS. 5A and 5B are diagrams exemplifying that record information input to a task management table III is reflected in a daily report;

FIGS. 6A and 6B are diagrams exemplifying that record information input to a task

management table I is reflected in a daily report;

FIG. 7 is a diagram illustrating a function to generate task management tables and a daily report involved by a table generation function unit;

FIG. 8 is a diagram illustrating an example of table generation processing using the task information tables;

FIG. 9 is a flowchart illustrating an example of processing of associating the task management tables with the daily report; and

FIG. 10 is a flowchart illustrating an example of construction management processing.

DETAILED DESCRIPTION

[0027] ONE EMBODIMENT

FIG. 1 illustrates a construction management system according to one embodiment. The configuration illustrated in FIG. 1 is an example, and the technology of the present disclosure is not limited to such a configuration.

[0028] The construction management system 2 is used for regular repair work or machinery inspection processing in various plants such as an oil refining plant, and the system executes construction plan management, which is an example of construction management, by a computer. In the construction management system 2, a daily report including, for example, daily work skill information, schedule information, and the like is generated or updated, and the information is shared by presenting the work schedule, the progress status, and the like to the worker and the plant owner by using the daily report. In the construction management system 2, for example, as illustrated in FIG. 1, a management server 4 and an information terminal 6 communicate with each other using a network 8, and perform transmission and reception of information necessary for creation processing of construction management forms including the daily report and construction management processing.

[0029] <Management Server 4>

The management server 4 is an example of the construction management device of the present disclosure, and is a device that performs processing of reflecting information between information tables and management processing including construction progress, in addition to processing of generating a plurality of information tables used for regular repair work, inspection processing of plant equipment, and the like. The management server 4 is a computer including a processor, a memory, an input/output unit (I/O), a communication unit, and the like. The management server 4 includes, for example, a processing unit 10, a memory unit 12, an information input unit 14, and an information presentation unit 16.

The processor is a functional unit that executes computation processing of various

programs such as an OS and a construction management program stored in the memory, and constitutes the processing unit 10.

The memory includes a memory element such as a ROM and a RAM, and is an example of a recording medium of the present disclosure. The memory constitutes a work area for performing the computation processing of, for example, the OS and the program, and also constitutes the memory unit 12 that stores a generated information table, database, and the like.

The input/output unit is an interface to which the information input unit 14 and the information presentation unit 16 are connected, and that takes input information into the management server 4 and outputs information from the management server 4 under the control of the processor.

The communication unit performs communication with the information terminal 6 and communication with an information source (not illustrated) under the control of the processor. This communication may be either wireless or wired communication.

[0030] The processing unit 10 includes, for example, a table generation function unit 20 that performs processing of generating or updating information tables used for construction management by computation processing of a construction management program, and a construction management function unit 22 including a function to store information input through the information terminal 6 in a specific information table and reflecting the information in a related information table.

The memory unit 12 stores, for example, a task information database (DB) 24 in which task information indicating processes and items of the regular repair work and the inspection is stored, a task management table 26 that is generated by the table generation function unit 20 and manages progress, quality, and the like of the construction work and the inspection for each piece of task information, work processes, record information, and the like and stores a daily report 28 to be presented to the worker or the plant owner.

[0031] The information input unit 14 is an example of a unit that inputs information to the management server 4 directly or through the information terminal 6, and authentication information such as an ID number of a manager, and includes, for example, an operation unit such as a keyboard and a touch panel, and a functional unit that communicates with the information terminal 6.

The information presentation unit 16 is an example of a unit that displays progress or result information of construction management and the like, and displays notification information of the task management table 26 and the daily report 28. The information presentation unit 16 is configured by an information presentation device such as an LCD.

[0032] <Information Terminal 6>

The information terminal 6 can be classified into a first terminal 30 and a plurality of second terminals 32 (= worker terminals 32-1, 32-2,..., 32-m) according to their assigned functions. Examples of the information terminals 6 include a mobile phone, a mobile PC, and other dedicated terminal devices used for the inspection work. The first terminal 30 is assigned to a first manager in charge of quality management of the construction work and the inspection processing, and each second terminal 32 is assigned to a second manager in charge of carrying out the construction work. These managers are, for example, a company, a person, or the like having the management authority among a plant owner and a partner company in charge of the regular repair work and the inspection.

[0033] The first terminal 30 includes a processing unit 302, an information presentation unit 304, an information input unit 306, and the like in a device housing. The processing unit 302 includes a processor, a memory unit, and an input/output unit, and runs its OS and the construction management program in the memory unit in association with the management server 4. The information presentation unit 304 includes a liquid crystal monitor or the like that displays the notification information of the task management table 26 and the like given from the management server 4. The information input unit 306 includes a keyboard, a mouse, a touch sensor, and the like.

[0034] The second terminal 32 includes, for example, a processing unit 322, an information input/presentation unit 324, and the like in a device housing. The processing unit 322 includes a processor, a memory unit, and an input/output unit, and runs its OS and the construction management program in the memory unit in association with the management server 4. The information input/presentation unit 324 is used for information input such as information selection, and information presentation. As with the first terminal 30, a screen unit of the information input/presentation unit 324 displays notification information and the like related to the construction work/inspection.

[0035] <Network 8>

The network 8 is an example of a unit that allows for data communication between the management server 4 and the information terminals 6 of the managers, for example, in a wired or wireless manner. For example, a public line may be used as the network 8, or a private line restricted to be accessible only in the plant may be used as the network 8.

[0036] <About Construction Management Function Unit 22>

FIG. 2 illustrates the construction management function using the daily report and the task management tables. The configuration of the task management tables 26 and the daily report 28, and the contents of information to be exchanged are illustrated in FIG. 2 as an example.

[0037] The construction management function unit 22 has a function to share, between the task management tables 26 and the daily report 28, process information including a schedule to be set and work tasks to be carried out on the day, record information generated based on the work such as the regular repair work and the inspection result, and the like.

For example, as illustrated in FIG. 2, the construction management processing has a function to reflect information such as date and time information and record information in the daily report 28 from three task management tables (I to III) 26-1, 26-2, and 26-3 generated for each management function with respect to the machinery, construction, inspection location, or the like of the construction management target. For example, the construction management function unit 22 reflects the information recorded in the task management tables (I to III) 26-1, 26 2, and 26-3 in the daily report 28 on the basis of the instruction information. The instruction information may be, for example, link information set in an input area of common task information and the like set in the task management tables (I to III) 26-1, 26-2, and 26-3 and the daily report 28, a database (not illustrated) associating the task management tables (I to III) 26-1, 26-2, and 26-3 and the daily report 28, or the like.

[0038] As a result, in the construction management function unit 22, for example, the date and time information set in the task management table II 26-2 is reflected in the daily report 28 on the basis of the set instruction information, and the construction information input to the task management table III 26-3 and the inspection/permission information input to the task management table I 26-1 are reflected in the daily report 28 as the record information of the construction work and inspection.

[0039] <About Progress Management Processing>

FIG. 3 illustrates a configuration example of a function to determine a task progress status involved by the construction management function unit. The content illustrated in FIG. 3 is an example.

[0040] The construction management function unit 22 has a function to determine a progress status of construction work on the basis of information reflected in the daily report 28 and present the determination result to the daily report 28. For example, as illustrated in FIG. 3, the construction management function unit 22 includes a schedule information setting unit 34, a record information acquisition and management unit 36, and a comparison function unit 38.

[0041] The schedule information setting unit 34 is an example of a functional unit that acquires, for example, task information and date information set in the task management tables 26 targeting to manage processes, or date information selected and input by the worker through the information terminal 6, and sets the acquired information in the daily report 28.

The record information acquisition and management unit 36 is an example of a

functional unit that sets, for example, confirmation information and completion information of the regular repair work, or the record information acquired from the task management tables 26 targeting to manage the machinery inspection result or the like in the daily report 28.

The comparison function unit 38 is an example of a functional unit that uses the schedule information and the record information set in the daily report 28 to compare the number of working days or work completion deadline conditions set for each work task with the completion status of the task, and calculates the progress status of the work on the determination date or the set date. For example, it suffices if the construction management function unit 22 generates display information indicating at least a delay of the work in the daily report 28 on the basis of the comparison result of the progress status and notifies the worker of the display information. The display information may be, for example, information indicating a delay, a display indicating a start date of a work task, a display indicating completion of the work task, or a display indicating a person in charge of inspection when the work content is alternately inspected between the worker and the plant owner.

Then, it suffices if the management server 4 notifies, for example, the information terminal 6 of the daily report 28 in which display information indicating the progress status is set.

[0042] <Processing of Reflecting Information in Daily Report 28>

FIGS. 4A and 4B illustrate a function to reflect information in a daily report from the task management table II. The content illustrated in FIGS. 4A and 4B is an example.

[0043] The task management table II 26-2 is an information table targeting to manage, for example, work tasks of regular repair work or inspection processing and the processes thereof including the work schedule, and is an example of the first task management table of the present disclosure. For example, as illustrated in FIG. 4A, the task management table II 26-2 includes a plurality of pieces of data 26-21, 26-22,... 26-2N for each piece of machinery or plant equipment, and includes at least a date section 40, a device name section 41, a task information section 42, a process management section 43, and a record input section 44.

[0044] In the date section 40, a calendar or the like is set as date information for performing the regular repair work or inspection, for example, a month and day is set.

The device name section 41 is an area for setting names of machinery and plant equipment to be managed, or a part thereof.

The task information section 42 is an area in which work information to be executed in the regular repair work or inspection processing is stored. In the information section 42, for example, adjustment processing may be performed such that the task information of a plurality of work tasks that can be executed simultaneously or on the same day is arranged in the vertical

direction according to a set work order.

The process management section 43 is an area that displays, on the calendar information, the processes such as the number of days for executing the task information set in the task information section 42. Although the case has been described that the process management section 43 displays the task information in the frame indicating the number of days, the display state is not limited to such a display state. In the task management table II 26-2, for example, the task information of the task information section 42 may be distinguished by color or pattern, and may be displayed by adding the same color or pattern to the frame of the process management section 43 corresponding to each piece of task information.

The record input section 44 is an area that stores the number of days from the start to completion of a work task, which is an example of the record information.

[0045] In the construction management processing, for example, "M1" that is a device name P1 set in the device name section 41 of the task management table II 26-2 and "5/10" that is a date P2 selected from the date section 40 are set as the common information for associating the daily report 28 and the other task management tables 26 with each other. In the construction management processing, as process information associated with the selected date "5/10", for example, a part of the task "A2" is set as process information S1, a part of the task "A5" is set as process information S2, and a part of the task "A6" is set as process information S3.

[0046] The daily report 28 reflects information input to the task management tables 26, and is a unit that presents such information to the worker or the manager. For example, as illustrated in FIG. 4B, the daily report 28 includes at least a header section 50, a device name section 51, a task information section 52, and a management information section 53.

[0047] The header section 50 is an area in which header information of the daily report is stored, and includes, for example, information on the manager or a person in charge of inputting information to the daily report, and summary information of symbols indicating progress status in addition to a date to be managed.

The device name section 51 is an area in which a name such as a machinery name or a plant name of the monitoring target or a part thereof is stored.

The task information section 52 is an area in which process information of the regular repair work and inspection, and work task information are stored.

The management information section 53 is an area in which the progress status of the task is stored. Information such as a construction result and an inspection result as schedule information, a completion date, building permission information from the plant owner, and the like are stored in the management information section 53 by the manager. In the schedule information, symbols representing different states are assigned to, for example, "new" indicating

the start of the process, “continuation” indicating the process in progress, and “completion” indicating the completion of the process. In addition, in the management information section 53, for example, a prohibition setting section 54 that disables management of task information that should not be executed is set on the basis of machinery information. In the prohibition setting section 54, for example, masking is set to prevent record information or the like from being input in the management information section 53.

[0048] In the construction management processing, for example, by a selection input for schedule information such as a date input to the management table II 26-2, the machinery to which construction processing performed at the date and time and the task information thereof are extracted. Then, the schedule information, the machinery information, and the task information are reflected in the daily report 28.

In the construction management processing, the information in which the device name P1 and the date P2, which are the common information set in the task management table II 26-2 for the daily report 28, are linked with the date in the device name section 51 and the header section 50, is read. In addition, in the construction management processing, the symbols indicating the progress status of the work are set in the work task “A5” S2 and the work task “A6” S3 on the basis of, for example, the process information set on the date P2. As such symbols, for example, a symbol “○” is set when work is started on the date, a symbol “~” is set when work is continuing, and a symbol “●” or the like is adopted when the work is completed. Then, the construction management function unit 22 reflects the information in the daily report 28 on the basis of the information set in the task management table II 26-2.

[0049] The processing of reflecting the process information including the date and time information set in the task management table II 26-2 in the daily report 28 is executed, for example, when a new daily report 28 is generated or updated on a daily basis or when a worker, a manager, or the like makes an access through the information terminal 6. Then, the construction management function unit 22 presents the daily report 28 reflecting the process information as the notification information to the information terminal 6, for example, when the worker or the manager accesses the management server 4 before starting the regular repair work or the preparation thereof, or the inspection processing, and inputs selection information such as a date and machinery information of the work target. By confirming the notified daily report 28, the worker or manager can grasp the task information planned on the day or on a designated date, the construction period, the progress status, and the like.

[0050] Meanwhile, for example, when only the process information is reflected in the daily report 28, the record information is not necessarily reflected in the management information section 53, or the record information such as the completion date may be reflected in the task

information in which the completion of the work is settled before the date designated in the daily report 28.

[0051] FIGS. 5A and 5B illustrate an example of a function to reflect information in the daily report from the task management table III. The configuration illustrated in FIGS. 5A and 5B is an example.

[0052] The task management table III 26-3 is, for example, an information table that uses the stored confirmation result with respect to the regular repair work for the function to manage construction quality, and is an example of the second task management table of the present disclosure. For example, as illustrated in FIG. 5A, the task management table III 26-3 includes a plurality of pieces of data 26-31, 26-32,... 26-3N for respective pieces of machinery or plant equipment, and includes a task information section 61, a confirmation content section 62, an inspection content section 63, a start information section 64, and a monitoring result section 65.

[0053] The task information section 61 is an area for storing task information that is a work process of regular repair work. In the task information section 61 or the task information stored in the task information section 61, link information or the like is set and associated with the common task information set in the other task management tables I 26-1 and II 26-2 and the daily report 28.

The confirmation content section 62 is an information transmission area capable of storing information such as processing contents to be executed in the regular repair work and the cautions. For example, the confirmation content section 62 stores text information such as instruction contents given by a manager to a person in charge of work and items pointed out in the past regular repair work.

[0054] The inspection content section 63 stores instruction information designating an inspection execution unit in the confirmation processing of the regular repair work. The instruction information includes, for example, “visual” that indicates an instruction for a manager to directly view and confirm or activate the camera of the information terminal 6 to confirm a captured image, and “document” that is an instruction for confirmation by a report or the like. Further, the information of the inspection content section 63 includes, for example, instruction information for the information terminal 6 that has been read from the task management table III 26-3, and together with the information of the “visual”, an imaging function such as a camera mounted on the information terminal 6 may be automatically activated to capture a still image, a moving image, or the like.

The start information section 64 is an area for storing information such as start dates of the regular repair work and the confirmation processing thereof. The start information section 64 may store checked date information, and may record a company name or the like of the

person in charge or the manager.

The monitoring result section 65 is an area that stores execution information including a confirmation result of the regular repair work, a completion date thereof, and the like. For example, in addition to a case where a confirmation result is directly input by the manager, information input to the other task management tables may be reflected in the monitoring result section 65.

[0055] In the construction management processing, for example, as illustrated in FIG. 5B, when the data 26-31 of the task management table III related to the common machinery to be managed is read, task information that is the same as or related to the date information set in the daily report 28 is extracted with reference to the execution information stored in the start information section 64 and the monitoring result section 65. In the construction management processing described here, for example, information related to date information of “5/10” reflecting the information of the task management table II 26-2 is extracted from the task management table III 26-3. In the task management table III 26-3, the construction management function unit 22 extracts task information “A5” S4 that is" 5/2" before “5/10” set in the start information section 64 and that does not store a confirmation date that is record information in the monitoring result section 65, and task information “A6” S5 that stores “5/10” in both the start information section 64 and the monitoring result section 65.

For example, at the time of the date information “5/10” set in the daily report 28, the construction management function unit 22 determines that the work is “continuing” because the confirmation result is not stored in the task information S4, and determines that the work is “completed” because the confirmation result is stored in the task information S5.

[0056] Meanwhile, the confirmation result stored in the monitoring result section 65 may be, for example, inspection/permission information that is an evaluation that the quality of the work task has reached a predetermined standard, or may be information indicating that the work has been completed regardless of the evaluation of the quality.

[0057] The construction management function unit 22 reads a blank result of the monitoring result section 65, which is the execution information for the task information S4, as record information Ra, and reads the date of “5/10” of the monitoring result section 65, which is the execution information for the task information S5, as record information Rb. When specifying the task information S4 and S5, which are the common information in the daily report 28, the construction management function unit 22 stores the record information Ra and Rb in the management information section 53. Furthermore, the construction management function unit 22 reads, for example, the process information and the record information Ra and Rb acquired from the task management table II 26-2, and compares the construction period with the

completion date in the comparison function unit 38 to determine the progress status of the task. For example, it suffices if the construction management function unit 22 provides the determination result on the progress status, for example, by generating and displaying display information distinguished by color, pattern, or the like for the management information section 53. For the display information, for example, a background color such as red or pink may be set as the information indicating the “delay” in the area of the “completion date” of the management information section 53, and a background color such as yellow may be set as the information indicating the “final date” of the construction work.

[0058] FIGS. 6A and 6B illustrate an example of a function to reflect information in a daily report from the task management table I. The configuration illustrated in FIGS. 6A and 6B is an example.

[0059] The task management table I 26-1 is, for example, an information table used for a function to manage an inspection progress status on the basis of the stored result of machinery inspection processing, and is an example of a second task management table of the present disclosure. The machinery inspection processing is executed by, for example, a manager on the plant owner side or a partner company that has contracted for the inspection processing, and includes processing that is mandated for machinery that works in the plant equipment, such as a heat exchanger and a pressure vessel, for the purpose of ensuring safety.

As illustrated in FIG. 6A, for example, the task management table I 26-1 includes a plurality of pieces of data 26-11, 26-12,... 26-1N for each machinery and equipment to be managed, and includes a device name section 70, a reflection section 71, a construction information section 72, a task information section 73, a management information input section 74, a completion monitoring section 75, and an authority section 76.

[0060] The device name section 70 stores a device name of the machinery as a target of the inspection progress management. Such a device name is used as information for association with the daily report 28 and the other task management tables II 26-2 and III 26-3.

Regarding the common device name, the reflection section 71 stores instruction information as to whether or not to reflect the input information in the daily report 28 and the other task management tables II and III. In the reflection section 71, for example, a symbol “○” is set as the instruction display of reflection for II and III, so that the determination result of the inspection progress management, the date information, and the like are reflected in the other task management tables II and III.

Meanwhile, for the daily report 28, the reflection section 71 reflects, for example, input information without setting the setting information (not illustrated) or the selection input.

[0061] The construction information section 72 is an area where the manager or the like can

input data such as text information and photographs using the information input unit 14 of the management server 4 or an input function of each information terminal 6. The construction information section 72 may store, for example, transmission information specific to the machinery in addition to specific work contents, an inspection procedure, cautions, and the like in the regular repair work.

[0062] The task information section 73 is an area in which task information indicating an inspection content is stored. In the task information section 73, for example, task information B2, B3, "pre-inspection", C1, D1,...and the like are arranged side by side in a sequential order of processes for performing inspection. Further, for example, classification information for classifying the task information may be set in the task information section 73.

The management information input section 74 is an area in which execution information such as the progress status, whether or not the task has been completed, and the date is stored with respect to the set task information. In the management information input section 74, for example, for each piece of task information, a portion in which the record information is to be reflected from the other task management tables II and III is "blank", and a check box or the like may be set for a portion in which the record information is to be directly input. In addition, for example, in the inspection processing for respective pieces of machinery, the management information input section 74 may set a blocking function to refrain information from being input to the un-executing task information, and may gray out the entry field.

[0063] The completion monitoring section 75 is an area in which a check result by the manager is to be input as to whether all of the task information set in the task management table I or a predetermined number of pieces of task information have been processed.

In the authority section 76, authority information necessary for a person in charge who can perform task completion determination and input processing of a check result to the management information input section 74 is set. In the construction management processing, for example, when the person in charge does not have necessary authority in the information input to the task management table I, processing of invalidating the input information or prohibiting the input of the information may be executed.

[0064] In the construction management processing, for example, as illustrated in FIG. 6B, when the data 26-11 of the task management table I related to the common machinery to be managed is read, task information that is the same as or related to the date information set in the daily report 28 is extracted with reference to the execution information stored in the management information input section 74 or the completion monitoring section 75. In this construction management processing, for example, the task information "B2" S6 in which the execution information is updated to "5/12" set as the determination date is read, and the update date is read

as record information Rc.

When specifying the task information S6, which is the common information in the daily report 28, the construction management function unit 22 stores the record information Rc in the management information section 53. Further, for example, the construction management function unit 22 may use the process information acquired from the task management table II 26-2 and the record information Rc, for example, to perform the determination processing of the progress status of the inspection processing, and may provide the determination result by generating and displaying the display information distinguished by color, pattern, or the like for the management information section 53. For the determination of the progress status of the inspection, processing similar to the task progress determination of the construction management processing using the task management table III 26-3 may be performed.

[0065] <Generation of Task Management Tables I to III 26-1, 26-2, and 26-3 and Daily Report 28>

FIG. 7 illustrates a function to generate task management tables and a daily report involved by the table generation function unit. The configuration illustrated in FIG. 7 is an example.

[0066] For example, as illustrated in FIG. 7, the table generation function unit 20 generates the task management table 26 and the daily report 28 for each set management function using the task information stored in the task information DB 24. In this construction management processing, for example, task management tables (I to III) 26-1, 26-2, and 26-3 related to three management functions are used. The task information set in the task management tables (I to III) 26-1, 26-2, and 26-3 is, for example, work process items performed in the regular repair work or preparation work therefor, such as scaffold assembly, thermal insulation and dismantling, anticorrosion coating, and repair, inspection processing items of the plant equipment, and the like, and includes management items for checking start, completion, a progress status, and the like of the construction work and the inspection.

[0067] In the task information DB 24, all pieces of task information to be performed in the regular repair work and inspection processing are stored, and machinery information, management function information, and the like corresponding to the task information are stored in association with each other. Then, in the processing of creating the task management tables 26 and the daily report 28, the table generation function unit 20 reads, for example, input or set machinery information and task information related to the management function, and stores the information in a predetermined location of the task management table 26 and the daily report 28.

[0068] Meanwhile, the number of management functions of generating the task management table 26 is not limited to three, and may be set for each piece of plant equipment, or may be

optionally set by the plant owner or the company carrying out the construction work. The number of management functions may also be set on the basis of construction and inspection contents mandated by law or the like.

[0069] <About Task Information Table 80>

FIG. 8 illustrates a configuration example of the task information table. The configuration illustrated in FIG. 8 and the generation processing of the task management tables and the daily report using the task information table are examples.

[0070] For example, in the generation processing of the task management tables 26 and the daily report 28, the table generation function unit 20 uses the task information table 80 to perform automatic generation processing of the plurality of task management tables I to III 26-1, 26-2, and 26-3 and the daily report 28. The task information table 80 is an example of the information processing table that stores task information to be executed in the regular repair work or inspection processing and automatically generates the task management table 26 and the daily report 28. The task information table 80, for example, as illustrated in FIG. 8, is sectioned for each of the task management tables I to III to be generated and the daily reports, and task information corresponding to each of the task management tables I to III and the daily reports is stored. The task information table 80 includes, for example, a number section 81, reflection sections 82, 84, and 86, task information sections 83, 85, 87, and 89, a classification section 88, a device name section 90, and a selection information input section 91, and is configured to arrange task processes in the vertical direction and the related task information in the horizontal direction in a matrix.

[0071] The number section 81 stores coordinate information in the vertical direction indicating the sequential order of processes and indicating the storage location of the task information with respect to the task information table 80.

The reflection sections 82, 84, and 86 are areas in which instruction information is to be set as to whether to link the common or related task information to the task management tables I to III 26-1, 26-2, and 26-3 generated for each management function, and the daily report 28. In the reflection sections 82, 84, and 86, for example, a symbol "○", a symbol "×", or the like is set as the instruction display as to whether or not to reflect the information. As a result, in the construction management processing, the record information based on the execution information can be reflected in the other task management tables according to the reflection instruction with respect to the execution information stored in the task information of the specific task management table 26.

[0072] The task information sections 83, 85, 87, and 89 are areas in which work tasks that are the work contents of the regular repair work and inspection are to be set, and task information

read from the task information DB 24 is stored. In the task information sections 83, 85, 87, and 89, for example, task information is stored for a set process for each management function. In the task information table 80, for example, processing contents that are the same as or highly related to the task information set in the same process (number section 81) are set. Therefore, in the task information sections 83, 85, 87, and 89, task information may not be stored for some management functions in a predetermined process. By doing so, in the predetermined process, there is a timing at which the task information is not selected, and the task information does not exist. At such timing, the task of construction work or inspection processing is not executed for the specific management function, and the specific management function enters a standby state.

[0073] The classification section 88 is an example of an area in which classification information of the task information is stored, and includes information indicating stages of the regular repair work or inspection. The classification section 88 stores information indicating the type of the construction work such as “incidental work”, “overhaul inspection”, “cleaning”, and “repair” in addition to broad classification such as “pre-work” and" inspection". These pieces of classification information are associated with the individual pieces of task information in the task information DB 24, for example.

[0074] Although the case where the classification section 88 is set for the daily report has been described, the present disclosure is not limited thereto. The classification section 88 may be provided within any of the management functions, or may be set with an independent setting item.

[0075] The device name section 90 is an area that stores a device name that generates and uses the task management tables 26 and the daily report 28 for performing construction management processing.

The selection information input section 91 is an example of a selection input section that selects the task information sections 83, 85, 87, and 89 of the task information table 80. That is, in the process of setting in the number section 81, for example, a symbol “○”, and either non-input or a symbol “×”, or the like is input to the selection information input section 91 as the display indicating the selection information of the task information. Then, the table generation function unit 20 stores the task information in the task management table 26 and the daily report 28 on the basis of the selection information and the number information input to the selection information input section 91. As a result, the task information is stored in the task information sections 42, 52, 61, and 73 on the basis of the process of the number section 81.

[0076] <Information Association Processing with Daily Report>

FIG. 9 illustrates processing of associating task management tables with a daily report. The processing content and the processing procedure illustrated in FIG. 9 are examples.

[0077] For example, as illustrated in FIG. 9, the association processing includes update processing of date and time information (S101), collation determination processing of a start process (S102), collation determination processing of a continuation process (S103), collation determination processing of the processes (S104), reflection processing of information (S105), and processing without reflection of information (S106).

[0078] For example, when a set time comes, on a daily basis, the management server 4 executes the construction management processing program to start the table generation function unit 20. The table generation function unit 20 performs update processing including generation of a new daily report 28 on the basis of, for example, date and time information acquired from a calendar function provided in the management server 4 or an external database (S101). Then, at the same time or with the set timing, the construction management function unit 22 refers to the task management table II 26-2 having the work processes as a management function, and determines whether the start process of the work task can be collated (S102). The collation of the start process of the work task is, for example, processing of determining whether there is a work task for which the work start is set on the day of the date set in the daily report 28, and when the work task for the work start is not set and the collation cannot be performed (NO at S102), it is determined whether the continuation process of the work task can be collated (S103). When there is a newly started work task (YES at S102) or when there is a continuing work task (YES at S103), these pieces of information are reflected in the daily report 28 (S105).

[0079] In addition, the construction management function unit 22 refers to the task management tables I 26-1 and III 26-3 to determine whether the completion process of the work task can be collated with one or both of the regular repair work and the inspection processing (S104). When the completion process can be collated (YES at S104), the construction management function unit 22 reflects the record information of the work task in the daily report 28 (S105). When the continuous process cannot be collated in the task management table II 26-2 (NO at S103) or when the completion process cannot be collated (NO at S104), the construction management function unit 22 does not reflect the information for the daily report 28 (S106).

[0080] <Construction Management Processing>

FIG. 10 illustrates a processing procedure of construction management processing. The processing illustrated in FIG. 10 is an example of the construction management method and the program of the present disclosure, and the technology of the present disclosure is not limited to such processing contents and processing procedure.

[0081] For example, as illustrated in FIG. 10, the construction management processing includes task information read processing (S201), daily report generation processing (S202), association

processing with the task management tables I to III (S203), daily report presentation processing according to the result of authentication processing of the worker (S204), execution information input processing to a specific task management table (S205), input authority determination processing (S206), reflection instruction confirmation processing (S207), record information reflection processing based on instruction information (S208), and daily report notification and display processing (S209).

[0082] The management server 4 executes the construction management processing program to start the table generation function unit 20 when the information set for the regular repair work or the inspection is input, or the input operation is performed by the manager, or the setting time comes. For example, when accessing the task information DB 24, the table generation function unit 20 reads the task information of the regular repair work or inspection associated with a machinery name that is a set monitoring target, the device type information thereof, plant information, and the like (S201), and generates a daily report 28 together with the task management tables 26 on the basis of the task information, the machinery information, and setting conditions such as the type and number of management functions (S202). The construction management function unit 22 associates the information stored in the task management tables 26 with the generated daily report 28 (S203). This association of the information may be performed as in the association processing of the information with the daily report as illustrated in FIG. 9.

[0083] In the construction management processing, the worker and the manager are authenticated using the identification information and the class information acquired through the information terminal 6, and the daily report 28 is presented to the information terminal 6 according to the authentication result (S204). The presentation processing of the daily report 28 is performed, for example, by the worker or the manager before starting the regular repair work or the inspection processing, and the confirmation of the work task on the day or the designated day is performed. In addition, the authentication processing may be performed, for example, by allowing a camera or the like of the information terminal 6 to read an ID tag or the like installed in the machinery or in the housing of the work target for construction work or inspection, and by accessing an authentication screen.

[0084] When confirming the input of the execution information such as the content monitoring and the inspection result of the construction work from the information terminal 6 of the manager to the specific task management table (S205), the construction management function unit 22 imports the identification information of the worker or the manager who has input the execution information, and confirms the presence or absence of the authority to the input operation (S206). When the user does not have the input authority (NO at S206), the

processing becomes a standby state until the execution information is input.

When confirming that the worker or the manager has the input authority (YES at S206), the construction management function unit 22 confirms whether an instruction to reflect the information is set in the task information or in the task management table to which the execution information has been input (S207). When the reflection instruction is set (YES at S207), the construction management function unit 22 reads the instruction information and the daily report 28, and reflects the execution information and the information generated using the execution information as the record information in the corresponding work task information in the daily report 28 (S208).

[0085] Then, for example, when the reflection instruction is not set in the task management table 26 (NO at S207) or when the input of the record information to the daily report 28 is completed, the construction management function unit 22 performs display processing of at least giving or updating the daily report 28 to the information terminal 6 of the worker or the manager (S209).

[0086] <Effects of One Embodiment>

With such a configuration, the following effects can be obtained.

[0087] (1) It is possible to automatically reflect the execution information input to the task management tables 26 in the daily report 28 on the basis of the common task information, and thus it is possible to reduce the workload of searching for information input locations for a large number of form documents and checking the input targets.

[0088] (2) The execution information stored in the task management tables 26 is reflected in the daily report 28 including the task information related to the construction plan and the inspection processing for the machinery to be managed. As a result, it is easy to grasp a series of information of construction work and inspection and the whole aspect of the construction work, and it is possible to reduce work loss such as by shortening the time of construction work.

[0089] (3) The execution information is automatically reflected for a large number of task management tables 26 and daily reports 28 that require input work in the construction management processing. As a result, it is possible to improve work quality by avoiding human errors in the information storage processing and improving work efficiency.

[0090] OTHER EMBODIMENTS

Modifications of the embodiments described above will be listed below.

[0091] (1) Although the regular repair work and the inspection of plant equipment have been described in the above embodiment, the technology of the present disclosure can be widely utilized for various types of construction work, inspection, and the like, and is not limited to the contents of the above embodiment.

[0092] (2) The construction management system of the present disclosure is not limited to the case where the management server 4 is independent of the information terminals 6. In the construction management system 2, for example, a processing unit, an input/output unit, and an information presentation unit that constitute the system may be mounted in one device housing, and the information terminals 6 described above may constitute the construction management system.

[0093] (3) In one of the above embodiments, it has been described that the task management tables 26 and the daily report 28 are generated and managed by the same management server 4 and stored in the common processing unit 10 or the memory unit 12, and the reflection instruction information is set for the common work tasks as the association between the task management tables 26 and the daily report 28, but the present disclosure is not limited thereto. The task management tables 26 and the daily report 28 may be, for example, stored in different management servers 4, and the execution information input to the task management tables 26 may be reflected in the daily report 28 as the record information. In this case, for the task management tables 26 and the daily report 28, for example, the information reflection processing may be carried out using address information or the like for specifying each management server 4 among a large number of management servers 4 arranged in the same LAN.

[0094] As described above, the most preferred embodiments and the like of the technology of the present disclosure have been described. The technology of the present disclosure is not limited to the above description. Various modifications and changes can be made by those skilled in the art based on the gist described in the claims or disclosed in DETAILED DESCRIPTION. It goes without saying that such modifications and changes are included in the scope of the technology of the present disclosure.

What is claimed is:

1. A construction management method using a computer, the construction management method comprising:

generating, by an information processing unit, a daily report associated with a plurality of task management tables including at least work task information, machinery information, and schedule information, the task management tables being generated for each management function using the common work task information;

selecting, by the information processing unit, the machinery information by receiving selection information of the schedule information input to a first task management table, extracting the work task information for each piece of the selected machinery information, and reflecting the work task information in the daily report; and

acquiring, by the information processing unit, record information associated with the schedule information and the machinery information from a second task management table to which execution information of a task including inspection has been input, and reflecting the record information in the daily report.

2. The construction management method according to claim 1, further comprising presenting, to an information terminal, the daily report including one or both of the work task information extracted based on the schedule information and the machinery information, and the record information.

3. The construction management method according to claim 1 or 2, comprising:

determining, by the information processing unit, a task progress status based on the schedule information and the record information; and

presenting, by the information processing unit, set display information to an information presentation unit based on a determination result of the progress status.

4. The construction management method according to any one of claims 1 to 3, comprising:

reading, by the information processing unit, the work task information from the task information tables recorded in a database, setting the work task information in the task management tables and the daily report, and setting the schedule information and the record information to be incapable of being input for the unselected task information based on the task selection information input in association with the machinery information.

5. A construction management system comprising:

an information processing unit configured to generate a daily report associated with a plurality of task management tables including at least work task information, machinery information, and schedule information, the task management tables being generated for each management function by using the common work task information, select the machinery information by receiving selection information of the schedule information input to a first task management table, extract the work task information for each piece of the selected machinery information and reflect the work task information in the daily report, and acquire record information associated with the schedule information and the machinery information from a second task management table to which execution information of a task including inspection is input, and reflect the record information in the daily report; and

an information terminal including an information presentation unit configured to present the daily report including one or both of the work task information extracted based on the schedule information and the machinery information, and the record information.

6. A program for causing a computer to execute:

a function to generate a daily report associated with a plurality of task management tables including at least work task information, machinery information, and schedule information, the task management tables being generated for each management function using the common work task information;

a function to select the machinery information by receiving selection information of the schedule information input to a first task management table, extract the work task information for each piece of the selected machinery information, and reflect the work task information in the daily report; and

a function to acquire record information associated with the schedule information and the machinery information from a second task management table to which execution information of a task including inspection is input, and reflect the record information in the daily report.

7. The program according to claim 6, for further causing the computer to execute a function to present, to an information terminal, the daily report including one or both of the work task information extracted based on the schedule information and the machinery information, and the record information.

8. The program according to claim 6 or 7, for causing the computer to execute:

a function to determine a task progress status based on the schedule information and the record information; and

a function to present set display information to an information presentation unit based on a determination result of the progress status.

9. The program according to any one of claims 6 to 8, for causing the computer to execute a function to read the work task information from the task information tables recorded in a database, set the work task information in the task management tables and the daily report, and set the schedule information and the record information to be incapable of being input for the unselected work task information based on the task selection information input in association with the machinery information.

10. A construction management device that manages construction work using a computer, the construction management device comprising:

a device housing; and

an information processing unit configured to generate a daily report associated with a plurality of task management tables including at least work task information, machinery information, and schedule information, the task management tables being generated for each management function using the common work task information, select the machinery information by receiving selection information of the schedule information input to a first task management table, extract the work task information for each piece of the selected machinery information, and reflect the work task information in the daily report, and acquire record information associated with the schedule information and the machinery information from a second task management table to which execution information of a task including inspection is input, and reflect the record information in the daily report.

11. A recording medium storing any one, or two or more of the task management table included in the construction management method according to any one of claims 1 to 4, the database included in claim 4, the task management tables included in the construction management system according to claim 5, and the program according to any one of claims 6 to 9.