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 or the like including regular repair work and inspection of, for example, an oil refining plant.

2. DESCRIPTION OF THE RELATED ART

[0002] Regular repair work or preparation work necessary for the regular repair work in oil refining plant equipment including a heat exchange system is ordered from an owner company that operates the plant to a partner company. Since such regular repair work 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 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 item database, and delivered to the terminal device according to a request (e.g., Patent Literature 1).

[0004] Regarding progress management of construction work, the following technique is known. In building work, a memory unit accumulates a construction plan including a plurality of processes, progress information of the construction plan, and an input plan of resources including persons or heavy equipment, and a record information acquisition unit acquires a progress ratio of each process and a resource input record. A production rate investigation unit compares a record production rate converted from the resource input record with a plan production rate converted from the resource input plan to determine a future production rate of the construction work, and a workload calculation unit calculates a remaining object amount and a workload on the basis of the future production rate (e.g., Patent Literature 2).

[0005] 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 3).

CITATION LIST

PATENT LITERATURE

[0006] Patent Literature 1: JP 2004-227307 A

Patent Literature 2: JP 2013-45308 A

Patent Literature 3: JP 2010-282496 A

SUMMARY OF THE INVENTION

[0007] In the regular repair work and the like of the heat exchange system included in the oil refining plant, an orderer is the owner company that operates the plant, and an order receiver is the partner company that undertakes construction processing and management thereof. The heat exchange system as a target of the regular repair work includes a plurality of heat exchangers having different specifications and the like, and a large number of related machinery. Since the regular repair work is performed by stopping the heat exchange system, a construction period for minimizing the stop period is required. In addition, elements such as system specifications and regular repair cost are also added as matters to be considered.

[0008] For the orderer of the regular repair work, management of progress, inspection according to the progress, and the like are main processing matters. On the other hand, the order receiver is required to grasp the concept of the orderer and the entire image of the system as the regular repair target, establish a regular repair plan, execute the construction processing, and receive the inspection of the orderer as required, to complete the regular repair work.

The regular repair work includes a plurality of processes such as construction progress, reporting, inspection permission, and confirmation. For example, when the regular repair work of one piece of machinery is completed, the inspection permission is given from the orderer who has received a report on the completion. If the inspection result does not reach an acceptance range, for example, does not meet a standard, the process cannot proceed to a next process. This management is excellent from the viewpoint of safety, but there is also a problem in that the construction progress is entrusted to an inspector of the orderer. Information sharing between the orderer and the order receiver is essential. Insufficient information sharing causes a

problem in that a temporal loss between the processes is induced in terms of basic points such as search for a position of inspection machinery.

[0009] In the management of the regular repair work, for example, there are management types such as a process, a progress status, and construction quality, and a management sheet created for each type is used. Therefore, even when the management is performed for one work item, it is necessary to find the management sheet for each management type and enter the same or related items in each management sheet. In addition, in order to link together the management sheets separately created as described above, it is necessary to manually perform a large number of processes. Since the management sheets are used for each of a large number of pieces of equipment, machinery, or management points in the oil refining plant, a huge amount of labor is required to search for and set the relevance.

In addition, since there are a large number of work items in the management of the regular repair work, there is a problem in that human errors are more likely to occur in reading the plurality of management sheets.

There is another problem in that construction work is delayed if a constructor or a manager takes time to confirm construction progress in addition to status information such as construction progress.

[0010] With regard to such problems, the configurations disclosed in Patent Literature 1 to Patent Literature 3 cannot solve the problems presented in the present disclosure.

[0011] The inventors of the technology 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 reduce the load of progress management and the like, shorten a regular repair time, and improve reliability by sharing record information for each task among a plurality of management functions.

[0012] In view of the above problems and findings, an object of the technology of the present disclosure is to improve the efficiency and work quality of regular repair work, inspection, and the like.

[0013] 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: creating, by an information processing unit, two or more task management tables each specified by a management function by using task information recorded in a database; inputting, by an information input unit, record information for each task to the specific task management table; reflecting, by the information processing unit, the record information acquired from the information input unit in any one, or two or more of the other task management tables; and presenting, by an information presentation unit, any one, or two or more of the task management

tables indicating transition of the record information.

[0014] The construction management method may include setting, by the information processing unit, authority to permit at least browsing, input, and revision processing with respect to the task management tables, and associating the authority with rank information of a manager.

[0015] The construction management method may include inputting, by the information processing unit, the record information or information generated based on the record information to task information in the other task management table(s) associated with task information in the specific task management table.

[0016] In order to achieve the above object, one aspect of a construction management system of the present disclosure is a construction management system including: a database configured to store two or more pieces of task information; an information processing unit configured to create two or more task management tables each specified by a management function by using the task information recorded in the database; and an information input unit configured to input record information for each task to the specific task management table, wherein the information processing unit reflects the record information acquired from the information input unit in any one, or two or more of the other task management tables.

In the construction management system, the information processing unit may further set authority to permit at least browsing, input, and revision with respect to the task management tables, and associate the authority with a rank of a manager.

[0017] The construction management system may further include an information presentation unit configured to present any one, or two or more of the task management tables indicating transition of the record information.

[0018] In order to achieve the above object, one aspect of a program of the present disclosure is a program, which is executed by a computer, causing the computer to execute: a function to create two or more task management tables each specified by a management function by using task information recorded in a database; a function to acquire record information for each task input to the specific task management table by an information input unit; a function to reflect the record information acquired from the information input unit in any one, or two or more of the other task management tables; and a function to present any one, or two or more of the task management tables indicating transition of the record information on an information presentation unit.

[0019] The program may cause the computer to execute a function to set authority to permit at least browsing, input, and revision processing with respect to the task management tables, and associate the authority with rank information of a manager.

[0020] The program may cause the computer to execute: a function to read task information in

the other task management table(s) associated with task information in the specific task management table; a function to read the record information or generate input information based on the record information; and a function to input the record information or the input information to the other task management table(s).

[0021] 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; a memory unit including a database configured to store two or more pieces of task information; an information processing unit configured to create two or more task management tables each specified by a management function by using the task information recorded in the database; and an information input unit configured to input record information for each task to the specific task management table, wherein the information processing unit reflects the record information acquired from the information input unit in any one, or two or more of the other task management tables.

[0022] 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 database and the task management tables included in the construction management method, the database and the task management tables included in the construction management system, and the program.

[0023] According to the present disclosure, the following effects can be obtained.

[0024] (1) Among the task management tables for each automatically generated management function, the record information input to the specific task management table is reflected in the other task management table(s). As a result, the workload of information input can be reduced, a time loss between tasks of regular repair work and inspection of a plant can be eliminated, and work efficiency can be improved.

[0025] (2) By automatically reflecting a management result of one task between the associated task management tables, it is possible to reduce the workload of search processing of the task management tables, confirmation processing of an input target, and the like.

[0026] (3) A time required for preparation for the regular repair work and the inspection can be shortened, process progress information and the like can be easily grasped, and the work quality of the construction work and the inspection can be improved by speeding up the processing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] FIG. 1 is a diagram illustrating a configuration example of a construction management system according to a first embodiment;

FIG. 2 is a diagram illustrating a generation function of task management tables;

FIG. 3 is a diagram illustrating a function of reflecting record information by a

construction management function unit;

FIGS. 4A and 4B are drawings illustrating an example of authentication processing of a manager and assignment of authority information;

FIG. 5 is a drawing illustrating a configuration example of a task management table I;

FIG. 6 is a drawing illustrating a configuration example of a task management table II;

FIG. 7 is a drawing illustrating a configuration example of a task management table III;

FIG. 8 is a drawing illustrating a configuration example of a task management table IV;

FIGS. 9A, 9B, and 9C are drawings illustrating an example of a state of inputting the record information and reflecting the record information in another task management table;

FIG. 10 is a drawing illustrating a configuration example of attached information;

FIGS. 11A and 11B are drawings illustrating another example of the state of inputting the record information and reflecting the record information in another task management table;

FIG. 12 is a flowchart illustrating an example of construction management processing;

FIG. 13 is a diagram illustrating a configuration example of a construction management system according to a second embodiment;

FIGS. 14A and 14B are drawings illustrating an example of a state of inputting the record information and reflecting the record information in another task management table; and

FIG. 15 is a flowchart illustrating an example of construction management processing.

DETAILED DESCRIPTION

[0028] FIRST EMBODIMENT

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

[0029] A construction management system 2 has a function to generate forms used for management of processes such as construction work before inspection, inspection processing, and recovery processing after the inspection, progress, recording of inspection results, and the like, and a function to notify a manager who executes the construction work, the inspection, and the like in regular repair work and the like of, for example, a heat exchange system installed in an oil refining plant. In addition, the construction management system 2 has a function to automatically reflect record information such as construction progress and inspection results input by the manager, with respect to related tasks among a plurality of generated forms. The form generation processing, the record information reflection processing, and information sharing management processing between managers are executed by a computer constituting a management server 4. In the construction management system 2, for example, as illustrated in

FIG. 1, the management server 4 and an information terminal 6 communicate with each other using a network 8, to exchange input information and notification information such as management information necessary for construction management processing.

[0030] <Management Server 4>

The management server 4 is an example of a construction management device of the present disclosure, and is a device that generates a plurality of management tables used for the regular repair work, the inspection processing of plant equipment, and the like, and performs the reflection processing of the record information including construction information, inspection information, and the like between the management tables. 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 construction management program, and also constitutes the memory unit 12 that stores a table, a database, and the like to be generated.

The input/output unit (I/O) 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.

[0031] The processing unit 10 includes, for example, a table generation function unit 20 that performs automatic generation processing of the management tables, and a construction management function unit 22 having a function to store information input through the information terminal 6 in a specific management table and reflect the information in a related management table, by the computation processing of the construction management program.

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, and 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.

[0032] 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 like. The information presentation unit 16 is configured by an information presentation device such as an LCD.

[0033] <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.

[0034] 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.

[0035] 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.

[0036] <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.

[0037] <About Table Generation Function Unit>

FIG. 2 illustrates a configuration example of the table generation function unit.

For example, as illustrated in FIG. 2, the table generation function unit 20 generates the task management table 26 for each set management function by using the task information stored in the task information DB 24. In this construction management processing, for example, four task management tables (I to IV) 26-1, 26-2, 26-3, and 26-4 are generated for four management functions. The task management tables 26 are generated for each construction management target such as machinery in plant equipment, or a component or a functional constituent unit constituting the machinery.

The task information includes, for example, work process items performed in the regular repair work, such as scaffold assembly, thermal insulation and dismantling, anticorrosion coating, and repair, inspection processing items of the plant equipment, and the like, and is an example of management items for checking start, completion, a progress status, and the like of the construction work and the inspection.

[0038] The task information DB 24 stores all pieces of task information performed in the regular repair work and the inspection, and also stores machinery information, management function information, and the like corresponding to the task information in association therewith. In the creation processing of the task management tables 26, the table generation function unit 20 reads the task information related to, for example, the input or set machinery information and management function information, and stores the information in each task management table 26.

[0039] Although the case where the task management tables (I to IV) 26-1, 26-2, 26-3, and 26-4 are generated corresponding to the four management functions has been described here, the present disclosure is not limited to this case. The management functions 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.

In addition, the table generation function unit 20 may include, for example, a task information table and an execution task selection table (not illustrated) used for selection

processing of the task information. The task information table is an example of a data table in which the task information to be executed is collected for each management function, and that is used for the automatic generation of the task management tables 26.

The execution task selection table is an example of a table for selecting the task information for each piece of machinery with respect to the task information stored in the task information table.

[0040] <About Construction Management Function Unit>

FIG. 3 illustrates the reflection function of the record information by the construction management function unit. The number of task management tables, record information contents, reflection destination information, and the like illustrated in FIG. 3 are examples.

The construction management function unit 22 has an information sharing function with respect to the record information generated in the regular repair work and the inspection. In this construction management processing, for example, as illustrated in FIG. 3, a state is illustrated in which the record information is reflected among the four task management tables (I to IV) 26-11, 26-21, 26-31, and 26-41 set for the specific machinery as the target of the construction management processing.

In the task management tables (I to IV) 26-11, 26-21, 26-31, and 26-41, for example, instruction information indicating a reflection destination is set for the record information input to the task information. The instruction information may be set in the task information as well as being set in the table generation function unit 20 in advance.

[0041] For example, based on the set instruction information, the construction management function unit 22 reflects inspection/permission information, which is the record information input to the task management table I 26-11, in any one or all of the task management tables (II to IV) 26-21, 26-31, and 26-41. For example, the construction management function unit 22 reflects construction information, which is the record information input to the task management table IV 26-41, in any one or all of the task management tables (I to III) 26-11, 26-21, and 26-31.

[0042] <About Authority Information of Manager>

FIGS. 4A and 4B illustrate authentication processing of a manager and assignment of authority information. A configuration illustrated in FIGS. 4A and 4B is an example.

The construction management system 2 performs authentication processing when an ID such as a name and a company name to which the manager belongs is input, or an identification card is presented at the time of entry into, for example, a site of a plant facility, and also performs authentication processing at the target machinery or the target functional unit of the regular repair work and the inspection. In this authentication processing, it is determined whether or not the manager is a person who is permitted to perform the regular repair work, the

inspection, and the like, or a person who has authority to input the record information to the task management tables 26.

[0043] For example, as illustrated in FIG. 4A, an ID tag 36 is installed directly on a housing or the like of work-target machinery 34, or near the machinery 34. The ID tag 36 is configured by, for example, a two-dimensional code. By reading the ID tag 36 using a camera of the terminal 32 or the like, the terminal 32 can access the management server 4, a database (not illustrated), or the like, and acquire the machinery information, work information associated with the machinery information, or the like.

For example, when the terminal 32 that has read the ID tag 36 accesses the management server 4, the construction management function unit 22 refers to the ID information or the like of the manager stored in the terminal 32, and causes the manager to input information necessary for authentication again. For example, when the authentication processing is completed, the construction management function unit 22 gives authority according to a rank of the manager. For this authorization, for example, an authority table 38 may be used as illustrated in FIG. 4B. In the authority table 38, for example, the rank information of the authenticated manager is associated with the authority information of the construction management processing. The authority information indicates, for example, at least a range of processing that can be executed in the regular repair work and the inspection, and whether the record information can be input to the task management tables 26.

[0044] Next, a configuration of the task management table for each function used in the regular repair work and the inspection will be described.

[0045] <Task Management Table I>

FIG. 5 illustrates a configuration example of the task management table I. A configuration illustrated in FIG. 5 is an example.

The task management table I is an example of an inspection progress management table used for, for example, management of an inspection progress status, and includes a plurality of pieces of data 26-11, 26-12,..., 26-1N for respective pieces of machinery or plant equipment. The task management table I includes, for example, a task information section 40, a device name section 41, a reflection section 42, a construction information section 43, a management information input section 44, a completion monitoring section 45, and an authority section 46.

[0046] The task information section 40 is an area in which one or a plurality of pieces of task information as an inspection target are stored. In the task information section 40, for example, task information B2, B3, “pre-inspection”, C1, D1,..., and the like are arranged side by side in a process order of performing the inspection. Furthermore, for example, classification information for classifying the task information may be set in the task information section 40.

[0047] The device name section 41 stores a device name of machinery as a target of the inspection progress management.

The reflection section 42 stores information for instructing setting as to whether or not to link input information with the other task management tables II, III, and IV generated for the same device. The reflection section 42 reflects a determination result of the inspection progress management, date information, and the like in the other task management tables II, III, and IV, for example, by setting a symbol "○" in II, III, and IV as the display indicating a linkage instruction.

The construction information section 43 is an area where the manager 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 43 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.

[0048] The management information input section 44 is an area in which information such as a progress status of the set task information, whether or not the task has been completed, and a date thereof is stored. In the management information input section 44, for example, for each task information, a portion in which the record information is reflected from the other task management tables II, III, and IV is "blank", and a check box or the like may be set in a portion to which the record information is directly input.

[0049] The completion monitoring section 45 is an area in which a check result by the manager is input as to whether the processing of all or a predetermined number of pieces of task information set in the task management table I has been completed.

In the authority section 46, authority information necessary for a person in charge who can determine the task completion and input the check results to the management information input section 44 and the completion monitoring section 45 is set. In the construction management processing, in a case where the person in charge does not have necessary authority to, for example, input information to the task management table I, the input information may be invalidated or the information input may be prohibited.

[0050] <Task Management Table II>

FIG. 6 illustrates a configuration example of the task management table II.

The task management table II 26-2 is, for example, a process chart used for management of work schedules of the regular repair work and the inspection processing, and includes a plurality of pieces of data 26-21, 26-22,..., 26-2N for respective pieces of machinery or plant equipment. The task management table II includes, for example, a date section 50, a

device name section 51, a classification section 52, a task information section 53, and a process management section 54.

[0051] The date section 50 sets calendar information for performing the regular repair work and the inspection, and includes, for example, a date entry frame.

The device name section 51 is an area in which a device name of a monitoring target is set.

The classification section 52 is an example of an area in which the classification information of the task information is stored, and includes information indicating the stages of the regular repair work and the inspection.

[0052] The task information section 53 is an area in which process information of the regular repair work and the inspection is stored. In the task information section 53, for example, adjustment processing may be performed so as to arrange the task information that can be simultaneously executed in a vertical direction on the basis of processing contents while maintaining the set order.

The process management section 54 displays the process for each day or half day in the calendar information regarding a processing execution schedule set for the task information arranged in the task information section 53. Although the case where the process management section 54 displays the task information within a frame indicating the number of days has been described, the process management section 54 is not limited to such a display state. In the task management table II, for example, the task information of the task information section 53 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 54 corresponding to each task information. In addition, the process management section 54 includes an information input area 55 along the processes and the calendar information. In the information input area 55, a process start date, a completion date, a progress status, and the like can be input as the record information of the work processes.

[0053] <Task Management Table III>

FIG. 7 illustrates a configuration example of the task management table III.

The task management table III 26-3 is an example of a daily report that, for example, gives daily process information of the regular repair work and the inspection processing, and stores a work result thereof to manage a work progress status and the like, and includes a plurality of pieces of data 26-31, 26-32,..., 26-3N for respective pieces of machinery or plant equipment. The task management table III includes, for example, a header section 60, a device name section 61, a task information section 62, and a management information section 63.

[0054] The header section 60 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, date information, description of information displayed in the daily report, and the like.

The device name section 61 is an area in which the device name of the monitoring target is set.

The task information section 62 is an area in which the process information of the regular repair work and the inspection, and the task classification information are stored.

The management information section 63 is an area in which the progress status of the task information 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 63 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.

[0055] <Task Management Table IV>

FIG. 8 illustrates a configuration example of the task management table IV.

The task management table IV 26-4 is, for example, a construction quality management table that stores monitoring results of the regular repair work and the inspection processing, and includes a plurality of pieces of data 26-41, 26-42,..., 26-4N for respective pieces of machinery or plant equipment. The task management table IV includes, for example, a classification section 70, a task information section 71, a confirmation content section 72, an inspection content section 73, a start information section 74, a monitoring result section 75, and an authority section 76.

[0056] The classification section 70 is an example of an area in which the classification information of the task information is stored, and includes the information indicating the stages of the regular repair work and the inspection.

The task information section 71 is an area in which the process information of the regular repair work and the inspection is stored.

The confirmation content section 72 is an information transmission area in which processing contents, cautions, and the like in the regular repair work and the inspection can be input. The confirmation content section 72 stores, for example, text information such as instruction contents given to a person in charge of work from the manager, and matters pointed out in past regular repair work and inspection.

[0057] The inspection content section 73 stores instruction information specifying execution means in the inspection processing. The instruction information includes, for example, “visual”

that is an instruction for the manager to directly view the target or check an image captured by activating a camera of the information terminal 6, and "document" that is an instruction for confirmation by a report or the like. In addition, the information of the inspection content section 73 includes, for example, instruction information to the information terminal 6 that has read the task management table IV. A camera application may be automatically activated when the information is "visual".

The start information section 74 is an area in which start dates and the like of the regular repair work and the inspection are stored. The start information section 74 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 75 is an area that stores check results of the regular repair work and the inspection. For example, the information may be directly input by the manager to the monitoring result section 75, or the information input to the other task management tables I, II, and III may be reflected in the monitoring result section 75.

In the authority section 76, the authority information of the person in charge who can determine the task completion and input the check result to the monitoring result section 75 is set. In the construction management processing, in a case where the person in charge does not have necessary authority to, for example, input information to the task management table IV, the input information may be invalidated or the information input may be prohibited.

[0058] <Input of Record Information>

FIGS. 9A, 9B, and 9C illustrate a state of inputting the record information and reflecting the record information in another task management table. Processing contents illustrated in FIGS. 9A, 9B, and 9C are examples.

Here, a case is illustrated in which the record information on quality check and completion in a specific process is input to the task management table IV.

For example, when a manager who carries out the regular repair work and performs quality confirmation and completion confirmation for each piece of task information accesses the management server 4 via the second terminal 32, the construction management function unit 22 notifies the manager of the task management table IV and enables information input for each piece of task information. In the task management table IV, for example, as illustrated in FIG. 9A, the start date of the construction work is input to the start information section 74, and record information RA, RB, and the like such as information indicating completion of quality confirmation of the construction work, and a date thereof is input to the monitoring result section 75 for each piece of task information. The quality management processing for the regular repair work is executed in the set task information order. When the construction work or the

inspection for one piece of task information is completed, the processing proceeds to the next piece of task information.

In the quality confirmation, instruction information 80 of the inspection content section 73 is read for each piece of task information, and monitoring processing is performed based on the specified contents. Here, on the basis of the "visual" instruction, the manager confirms the quality with the naked eye, and activates the camera of the second terminal 32 to record the image of the monitoring target such as the machinery or the functional unit thereof.

[0059] For example, the construction management function unit 22 reads the record information RA, RB, and the like on the quality confirmation input to the task management table IV, and reads the task management table II for managing the construction processes on the basis of the instruction information of the preset reflection destination. For example, as illustrated in FIG. 9B, the construction management function unit 22 analyzes the acquired record information RA and RB, generates record information showing period information in a bar graph shape, and reflects the record information in the information input area 55. The period information may be generated using, for example, the start date and the completion date of each of the record information RA and RB input in the quality management for each piece of task information. Furthermore, when the period information based on the record information RA and RB is reflected, the construction management function unit 22 may generate and display a so-called progress line 81 indicating the next pieces of task information scheduled to be executed on the same day or the same day of the week in a connected manner by using date or day-of-the-week information of a calendar function or the like.

[0060] In addition, for example, the construction management function unit 22 reads the task management table III used for managing the work progress status and the like on the basis of the instruction information of the preset reflection destination, and reflects the record information RA and RB on the quality confirmation. For example, as illustrated in FIG. 9C, the construction management function unit 22 refers to the task information set in the task information section 62, and inputs the acquired record information RA, RB, and the like to the management information section 63.

[0061] These pieces of record information RA and RB on the quality confirmation include attached information 82 generated based on the date information, and the instruction information of the inspection content section 73. For example, as illustrated in FIG. 10, the attached information 82 includes an image section 84 captured by the second terminal 32, and an information section 86 including the device name of the target machinery, the task information, the date, the manager name, and the like. The attached information 82 may be generated by, for example, the second terminal 32 or the construction management function unit 22 using data

acquired from the second terminal 32.

[0062] <Input of Another Record Information>

FIGS. 11A and 11B illustrate the reflection processing of the record information input to another task management table. Processing contents and a configuration illustrated in FIGS. 11A and 11B are examples.

Here, for example, a case is illustrated in which the record information on an inspection result is input to the task management table I 26-1.

For example, when a manager who performs the inspection accesses the management server 4 via the first terminal 30, the construction management function unit 22 notifies the manager of the task management table I and enables information input for each piece of task information. In the task management table I, for example, as illustrated in FIG. 11A, record information RC such as clicking of the check box indicating completion of the inspection is input for each piece of task information.

[0063] For example, the construction management function unit 22 reads the record information RC on the inspection completion input to the task management table I, and reads the task management table IV for managing the construction processes on the basis of the instruction information of the preset reflection destination. In addition, the construction management function unit 22 uses, for example, a calendar function, a timer function, or the like in the management server 4 or an external database to acquire date and time information when the record information RC is input to the task management table I. For example, as illustrated in FIG. 11B, the construction management function unit 22 analyzes the acquired record information RC, specifies the same or related task information set in the task management table IV, and automatically inputs the date and time information, information on the manager who has performed the inspection, and the like based on the record information RC, to the monitoring result section 75.

[0064] When these pieces of record information RA, RB, and RC are input to the specific task management table by the manager and are reflected in another task management table, the construction management function unit 22 transmits notification information to the information terminal 6 of the set manager with respect to the task management table(s) whose contents have changed or all the task management tables.

[0065] <About Construction Management Processing>

FIG. 12 illustrates a processing procedure of the construction management processing. Processing illustrated in FIG. 12 is an example of a construction management method and program of the present disclosure, and the technology of the present disclosure is not limited to such processing contents and a processing procedure.

For example, as illustrated in FIG. 12, the construction management processing includes read processing of the task information (S101), generation processing of the task management tables (S102), authentication processing of the manager (S103), association processing of the authority to the manager (S104), input confirmation processing of the record information (S105), confirmation processing of the input authority (S106), confirmation processing of the reflection instruction (S107), reflection processing of the record information (S108), notification and display processing of the task management table(s) (S109), and confirmation processing of the task completion (S110).

[0066] The management server 4 starts the table generation function unit 20 by executing the construction management program in response to set information for the regular repair work and the inspection, or an input operation by the manager. For example, when accessing the task information DB 24, the table generation function unit 20 reads the task information of the regular repair work and the inspection associated with a machinery name as a set monitoring target, type information thereof, plant information, and the like (S101), and generates the task management tables (I to IV) 26-1, 26-2, 26-3, and 26-4 using the task information, the machinery information, and setting conditions such as the type and number of the management functions T1 to Tn (S102).

[0067] The management server 4 starts the construction management function unit 22 by executing the construction management program based on an instruction to start the regular repair work and the inspection. The construction management function unit 22 authenticates the manager using the identification information, the rank information, and the like of the manager acquired through the information terminal 6 (S103), and reads the authority table 38 to perform the association processing including the assignment of the authority with respect to the rank information of the manager (S104).

The construction management function unit 22 monitors whether the record information such as the monitoring of the construction contents and the inspection result is input from the information terminal 6 of the manager to the specific task management table (S105). When determining that the record information is input to the specific task management table (YES at S105), the construction management function unit 22 acquires the identification information of the manager who has input the record information, and confirms whether or not the manager has the authority to perform the input operation (S106). When the manager does not have the input authority (NO at S106), the construction management function unit 22 invalidates the input record information, and waits until a person having the input authority inputs the record information.

When confirming the input authority of the manager (YES at S106), the construction

management function unit 22 confirms whether the instruction to reflect the information is set in the task information or the task management table to which the record information is input (S107). When the reflection instruction is set (YES at S107), the construction management function unit 22 reads the instruction information and the other task management table(s) set in the instruction information, generates information based on the record information according to management contents using the other task management table(s) 26 as the reflection destination, and reflects the information in the other task management table(s) 26 (S108). For example, when the reflection instruction is not set in the task management table 26 (NO at S107), or when the reflection of the record information in the other task management table(s) 26 is completed, the construction management function unit 22 performs the notification and update display processing of the task management table(s) 26 to the information terminal 6 of the manager (S109).

[0068] In the construction management processing, it is determined whether or not the regular repair work and the inspection for all the tasks have been completed (S110). When all the tasks are completed (YES at S110), the processing is terminated. On the other hand, in the construction management processing, when the specific task management table has the task information indicating the next process, that is, when not all the tasks are completed (NO at S110), a standby state is set until the input of the record information.

[0069] <Effects of First Embodiment>

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

[0070] (1) The task management table for each management function can be automatically generated, and the record information input to the specific task management table can be automatically reflected in the other related task management table(s).

[0071] (2) Since the instruction information set in the task information or the task management table can be read, and the record information can be automatically reflected in the other task management table(s) by the management server 4, it is possible to reduce the workload of search for the task management tables and collation of the task information.

[0072] (3) By automatically reflecting the record information between the task management tables, it is possible to avoid human errors such as a selection mistake and an input mistake in the task information collation or record information input processing, so that the reliability of the construction management processing is improved.

[0073] SECOND EMBODIMENT

FIG. 13 illustrates a configuration example of a construction management system according to a second embodiment. A configuration illustrated in FIG. 13 is an example, and the technology of the present disclosure is not limited to such a configuration. In FIG. 13, the

same components as those in FIG. 1 are denoted by the same reference numerals, and the description thereof will be omitted.

In the construction management system 2, for example, as illustrated in FIG. 13, a case is illustrated in which both a first manager and a second manager perform the quality confirmation and the completion confirmation, or the inspection processing for each piece of task information, and individually input the record information to complete the tasks in the regular repair work and the inspection processing. Therefore, the construction management system 2 acquires the input information and the authentication information from each of the terminals 30 and 32. The construction management system 2 also presents a management screen including the task management table 26 on the terminals 30 and 32 and notifies the terminals 30 and 32 of alert information for prompting task execution. For example, the alert information may be given to a mail address held by each manager, or given by using an alarm function of a clock, a schedule application, and the like stored in the terminals 30 and 32. Alternatively, the task management table 26 may be given and displayed on a display unit at a timing according to the order of the construction management processing.

[0074] <Input of Record Information>

FIGS. 14A and 14B illustrate a state of inputting the record information. Processing contents illustrated in FIGS. 14A and 14B are examples.

Here, a case is illustrated in which the record information on quality check and completion in a specific process is input to the task management table IV.

For example, when the second manager who carries out the regular repair work and performs the quality confirmation and the completion confirmation for each piece of task information accesses the management server 4 via the terminal 32, the construction management function unit 22 notifies the second manager of the task management table IV 26-4 and enables information input for each piece of task information. In the task management table IV, for example, as illustrated in FIG. 14A, the start date of the construction work is input to the start information section 74, and the record information RA, RB, or the like such as the information indicating the completion of the quality confirmation of the construction work, and the date thereof is input to the monitoring result section 75 for each piece of task information. In the task management table IV, for example, an input section 90 to which the first manager inputs the record information is also formed. For example, when the second manager inputs the record information RB, the input section 90 may be displayed so as to blink or displayed in changed color in a part or the whole of the input section 90, as the processing indicating transition of management authority.

[0075] For example, when confirming the input of the record information RB by the second

manager, the construction management function unit 22 notifies the first terminal 30 of the alert information to inform that confirmation processing of the task information is performed, and displays the task management table IV on the first terminal 30.

For example, when the first manager accesses the management server 4 via the terminal 30 in response to the alert notification, the construction management function unit 22 notifies the first manager of the task management table IV after performing the authentication processing, and enables information input for each piece of task information. For example, as illustrated in FIG. 14B, in the task management table IV, record information RD is input to the input section 90 by the first manager. The record information RD may be, for example, the information indicating the completion of the quality confirmation of the construction work, and the date thereof similarly to the other pieces of record information RA and RB. In addition, the record information RD may be a check symbol indicating completion of the current task information or transition to the next task information.

[0076] Although the case where the first manager inputs the record information after the second manager inputs the record information in the construction confirmation or inspection result input processing has been described here, the present disclosure is not limited to this case. The first manager may input the record information first.

[0077] In the construction management processing, when these pieces of record information RB and RD are input by the first manager and the second manager, one or both of these pieces of information are input to the other task management table(s), so that the information is shared. The reflection destination of the record information RB and RD may be as described above any one of the task management tables I, II, and III, or a combination of two or more of them, for example.

[0078] <About Construction Management Processing>

FIG. 15 illustrates a processing procedure of the construction management processing. Processing illustrated in FIG. 15 is an example of the construction management method and program of the present disclosure, and the technology of the present disclosure is not limited to such processing contents and a processing procedure. In FIG. 15, the same components as those in the processing contents illustrated in FIG. 12 will not be described in detail.

[0079] For example, as illustrated in FIG. 15, the construction management processing includes generation processing of the task management tables (S201), authentication processing of the second manager (S202), notification processing of the task management table (S203), acquisition processing of the record information (S204), confirmation processing of the input authority (S205), notification processing to the first terminal 30 (S206), authentication processing of the first manager (S207), notification processing of the task management table (S208), acquisition

processing of the record information (S209), reflection processing in the other task management table(s) (S210), notification and display processing of the task management table(s) (S211), and transition processing to the next task (S212).

[0080] The management server 4 starts the table generation function unit 20, and generates the task management tables (I to IV) using the machinery name as the set monitoring target, the type information thereof, and the task information stored in the task information DB 24 (S201).

When starting the construction management function unit 22 by executing the construction management program, the management server 4 authenticates the second manager by the identification information, the rank information, and the like of the second manager acquired through the second terminal 32 (S202), and gives the task management table for the set management function (S203). This authentication processing also includes giving the authority to input the record information according to the rank information included in the identification information of the manager.

When acquiring the record information input from the second terminal 32 (S204) and confirming that the manager having the input authority has input the record information (YES at S205), the construction management function unit 22 performs the notification processing of the alert information and the like to the first terminal 30 (S206). When the record information is input by a person having no input authority (NO at S205), the construction management function unit 22 invalidates the input record information and waits until a person having the input authority inputs the record information.

[0081] The construction management function unit 22 authenticates the first manager by the identification information, the rank information, and the like of the first manager acquired through the first terminal 30 (S207), and gives the task management table for the set management function (S208). When acquiring the record information input from the first terminal 30 (S209), the construction management function unit 22 reflects one or both of these pieces of record information or information generated using these pieces of record information in the other task management table(s) based on the reflection instruction information (S210).

After performing the notification and display processing of the task management table(s) to which the record information is input, to one or both of the first terminal 30 and the second terminal 32 (S211), the construction management function unit 22 moves to the next task of the regular repair work and the inspection processing (S212).

[0082] <Effects of Second Embodiment>

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

[0083] (1) Effects similar to those of the first embodiment can be obtained.

(2) Suppose that the content and completion confirmation is performed by a plurality of

managers regarding the regular repair work and the inspection. Even in such a case, when one manager inputs the record information, the alert information is given to another manager to prompt the execution of the management processing. Thus, it is possible to speed up the processing.

(3) By confirming the construction and inspection contents and inputting the record information by the plurality of managers, the execution state of the task processing can be precisely managed, and the quality of the construction and inspection tasks can be improved.

[0084] OTHER EMBODIMENTS

Modifications of the embodiments described above will be listed below.

[0085] (1) Although the regular repair work and the inspection of plant equipment have been described in the above embodiments, 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 embodiments.

[0086] (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.

[0087] (3) In the above embodiments, the case where the first manager is the plant owner and the second manager is the partner company that performs the construction work has been described. However, the present disclosure is not limited to this case. Regarding the regular repair work and the inspection of plant equipment, both the first manager and the second manager may be the partner companies. For example, these partner companies may both have authority to perform the regular repair work and the inspection, or each of them may perform only one of the regular repair work and the inspection. Alternatively, one of the managers may perform only the confirmation processing of the construction work and the inspection.

[0088] 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:

creating, by an information processing unit, two or more task management tables each specified by a management function by using task information recorded in a database;

inputting, by an information input unit, record information for each task to the specific task management table;

reflecting, by the information processing unit, the record information acquired from the information input unit in any one, or two or more of the other task management tables; and

presenting, by an information presentation unit, any one, or two or more of the task management tables indicating transition of the record information.

2. The construction management method according to claim 1, comprising setting, by the information processing unit, authority to permit at least browsing, input, and revision processing with respect to the task management tables, and associating the authority with rank information of a manager.

3. The construction management method according to claim 1 or 2, comprising inputting, by the information processing unit, the record information or information generated based on the record information to task information in the other task management table(s) associated with task information in the specific task management table.

4. A construction management system comprising:

a database configured to store two or more pieces of task information;

an information processing unit configured to create two or more task management tables each specified by a management function by using the task information recorded in the database; and

an information input unit configured to input record information for each task to the specific task management table,

wherein the information processing unit reflects the record information acquired from the information input unit in any one, or two or more of the other task management tables.

5. The construction management system according to claim 4, wherein the information processing unit further sets authority to permit at least browsing, input, and revision

with respect to the task management tables, and associates the authority with a rank of a manager.

6. The construction management system according to claim 4 or 5, further comprising an information presentation unit configured to present any one, or two or more of the task management tables indicating transition of the record information.

7. A program, which is executed by a computer, for causing the computer to execute:

a function to create two or more task management tables each specified by a management function by using task information recorded in a database;

a function to acquire record information for each task input to the specific task management table by an information input unit;

a function to reflect the record information acquired from the information input unit in any one, or two or more of the other task management tables; and

a function to present any one, or two or more of the task management tables indicating transition of the record information on an information presentation unit.

8. The program according to claim 7, for causing the computer to execute a function to set authority to permit at least browsing, input, and revision processing with respect to the task management tables, and associate the authority with rank information of a manager.

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

a function to read task information in the other task management table(s) associated with task information in the specific task management table;

a function to read the record information or generate input information based on the record information; and

a function to input the record information or the input information to the other task management table(s).

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

a device housing;

a memory unit including a database configured to store two or more pieces of task information;

an information processing unit configured to create two or more task management tables

each specified by a management function by using the task information recorded in the database; and

an information input unit configured to input record information for each task to the specific task management table,

wherein the information processing unit reflects the record information acquired from the information input unit in any one, or two or more of the other task management tables.

11. A recording medium storing any one, or two or more of the database and the task management tables included in the construction management method according to any one of claims 1 to 3, the database and the task management tables included in the construction management system according to any one of claims 4 to 6, and the program according to any one of claims 7 to 9.