METHOD, SYSTEM, PROGRAM, RECORDING MEDIUM, DEVICE, AND DATABASE 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 of an oil refining plant and inspection thereof are performed by stopping the operation of a part or all of the plant including various pieces of equipment as construction targets. In order to minimize a period during which the operation is stopped, management of a construction plan and construction progress is required. For this progress management, it is necessary to grasp the plant equipment, to refine the construction plan including the regular repair work and the inspection, and to speed up the processing.

[0003] Regarding information management of construction work, it is known that equipment information indicating an appearance of equipment in a power plant or a position in the plant is stored in an information storage unit, and when any maintenance work, which has been performed, is being performed, or is scheduled to be performed, is specified, equipment information related to the specified maintenance work is presented from among the equipment information in the information storage unit (e.g., Patent Literature 1).

CITATION LIST

PATENT LITERATURE

[0004] Patent Literature 1: JP 2005-321882 A

SUMMARY OF THE INVENTION

[0005] The regular repair work of the oil refining plant and the inspection thereof are performed by a plant owner (construction/inspection orderer) and a partner company in charge of the regular repair work and the inspection thereof, and a large number of personnel are sent from the plant owner side and the partner company.

[0006] The number of targets of the regular repair work and the inspection thereof increases depending on the scale of the oil refining plant. In a case where a single oil refining plant has a plurality of plants and there are several thousands of equipment drawings showing the construction targets, there is a problem in that it takes a considerable time to specify construction

points and collate the construction points with spool drawings.

[0007] Construction planning and progress management of construction work including a preparation process to an actual process are deeply involved in speeding up the construction work. There is a problem in that a time loss in the preparation process hinders improvement in the efficiency of the construction work, reduces a time for the main actual process, and causes an increase in construction cost, a decrease in construction quality, and the like. In addition, in the construction work and the inspection thereof, if processing in the construction process or the progress management takes time, there is a problem in that not only the progress of the construction work is hindered but also the quality of the construction work is affected.

[0008] Such problems are not disclosed in Patent Literature 1 or the like, and the management method described in Patent Literature 1 cannot solve such problems at all.

[0009] The inventors of the present disclosure have found that it is possible to reduce a time required for a preparation process by facilitating a collation process between drawing information and construction information including a construction plan, construction contents, inspection contents, and the like with respect to the presence of an enormous amount of drawing information showing a construction-target plant and its equipment, thereby making it possible to advantageously suppress construction cost and avoid quality degradation.

[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, according to one aspect of a construction management method of the present disclosure, a construction management method is for managing construction work using a computer, the method including: generating a database specified by equipment information, and storing, in the database, at least position information, drawing information, and construction information among the equipment information associated by management information; specifying position information indicating an equipment position from the position information, and selecting drawing information specified by the position information from the drawing information; and adding association between the position information specified on the drawing information and the construction information, and instruction information indicating the association, to the drawing information.

[0012] The construction management method may further include: deploying the drawing information on an image presented on an information presentation unit; accepting selection of the instruction information from the image, and reading at least the construction information specified by the equipment position from the database; and presenting the construction information on the image.

[0013] The construction management method may further include: writing message

information into the drawing information on an image presented on an information presentation unit; storing the message information in the database in association with the drawing information; and presenting the message information together with the drawing information on the image.

[0014] In the construction management method, the construction information may include at least any one, or two or more of a construction plan, a construction content, and an inspection content.

[0015] In order to achieve the above object, according to one aspect of a construction management system of the present disclosure, a construction management system manages construction work using a computer, the system including: a memory unit configured to store a database specified by equipment information, and store, in the database, at least position information, drawing information, and construction information among the equipment information associated by management information, for each piece of the equipment information; a server configured to specify position information indicating an equipment position from the position information, select drawing information specified by the position information from the drawing information, add association between the position information specified on the drawing information and the construction information, and instruction information indicating the association, to the drawing information, and store the drawing information in the database; and an information terminal including an information presentation unit configured to present at least any one, or two or more of the position information, the drawing information, and the construction information.

[0016] In order to achieve the above object, according to one aspect of a program of the present disclosure, a program is executed by a computer, the program causing the computer to execute: a function to generate a database specified by equipment information, and store, in the database, at least position information, drawing information, and construction information among the equipment information associated by management information, for each piece of the equipment information; a function to specify position information indicating an equipment position from the position information, and select drawing information by the position information; and a function to add association between the position information specified on the drawing information and the construction information, and instruction information indicating the association, to the drawing information, and store the drawing information in the database.

[0017] The program may further cause the computer to execute: a function to deploy the drawing information on an image of an information presentation unit; a function to accept selection of the instruction information from the image, and read at least the construction information specified by the equipment position from the database; and a function to present the

construction information on the image of the information presentation unit.

[0018] The program may further cause the computer to execute: a function to write message information into the drawing information on an image presented on an information presentation unit; a function to store the message information in the database in association with the drawing information; and a function to present the message information together with the drawing information on the image.

[0019] 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 included in the construction management method, the database included in the construction management system, and the program.

[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, the device including: a device housing; a memory unit configured to store a database specified by equipment information, and store, in the database, at least position information, drawing information, and construction information among the equipment information associated by management information, for each piece of the equipment information; a processing unit configured to specify position information of an equipment position from the position information, select drawing information by the position information, add association between the position information specified on the drawing information and the construction information, and instruction information indicating the association, to the drawing information, and store the drawing information in the database; and an information presentation unit configured to present at least any one, or two or more of the position information, the drawing information, and the construction information, wherein two or more of the memory unit, the processing unit, and the information presentation unit are mounted in the device housing.

[0021] In order to achieve the above object, one aspect of a database of the present disclosure is a database that is specified by equipment information, the database including: a first data storage unit configured to store at least position information, drawing information, and construction information among the equipment information associated by management information, for each piece of the equipment information; and a second data storage unit configured to store the management information.

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

(1) Drawing information corresponding to a construction point and the like can be selected based on the position information indicating the equipment position. The association between the position information specified on the drawing information and the construction information, and the instruction information thereof can be recognized from the drawing

information. A person in charge of construction work and a manager thereof can grasp and share the construction plan, its position, or the inspection content from the construction information and the instruction information thereof when the position information of the equipment position is specified. This makes it possible to facilitate information retrieval such as drawing collation, eliminate a time loss between tasks, and improve work efficiency.

[0023] (2) It is possible to recognize a series of pieces of information such as the construction plan, the construction content, and the inspection content included in the equipment information of a construction target at once, thereby facilitating grasping of the entire contents of construction work and achieving loss reduction such as time reduction.

[0024] (3) A time required for preparation for construction work can be shortened, progress information and the like in the construction process can be easily grasped, and the work quality of construction work and inspection can be improved by speeding up the processing.

[0025] (4) It is possible to improve the efficiency of document organization and record management upon completion of construction work and inspection, and to contribute to rationalization of construction work and inspection, such as work sampling.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] FIG. 1 is a diagram illustrating a construction management system according to a first embodiment;

FIG. 2 is a diagram illustrating a construction management database (DB);

FIGS. 3A to 3C are diagrams respectively illustrating an overall plant diagram, a plant diagram, and a construction/inspection instruction diagram;

FIG. 4 is a flowchart illustrating a processing procedure of a preparation process;

FIG. 5 is a diagram for explaining selection of a plant diagram and input of position information;

FIG. 6 is a flowchart illustrating a processing procedure of a construction plan;

FIG. 7A is a drawing illustrating a construction plan input screen;

FIG. 7B is a drawing illustrating a construction/inspection instruction screen;

FIG. 8A is a drawing illustrating an example of a construction/inspection content presentation screen;

FIG. 8B is a drawing illustrating an example of a construction/inspection instruction diagram to which an inspection symbol, a construction symbol, and a color mark are given;

FIG. 8C is a drawing illustrating the construction symbol and the color mark;

FIG. 9 is a flowchart illustrating a processing procedure of an inspection method;

FIG. 10 is a flowchart illustrating a processing procedure of incidental work;

FIG. 11 is a drawing illustrating an example of an input content presentation screen;

FIG. 12 is a drawing illustrating an example of a construction specification list presentation screen;

FIGS. 13A to 13D are diagrams illustrating a relationship between the construction specification list presentation screen and link information;

FIG. 14 is a flowchart illustrating a processing procedure of a construction plan according to a second embodiment; and

FIG. 15 is a drawing illustrating a construction/inspection content presentation screen according to the second embodiment.

DETAILED DESCRIPTION

[0027] FIRST EMBODIMENT

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

[0028] A construction management system 2 is used for, for example, regular repair work and inspection of various plants such as an oil refining plant, and manages a construction plan using a computer.

[0029] As illustrated in FIG. 1, the construction management system 2 includes a management server 4 and a plurality of information terminals 6. The management server 4 and the information terminals 6 are linked by a network 8.

[0030] <Management Server 4>

The management server 4 is configured by, for example, a computer having a communication function. The management server 4 includes a processor 10, a memory unit 12, an input/output unit (I/O) 14, and a communication unit 16.

[0031] The processor 10 is an example of a processing unit for executing information processing and control. The processor 10 runs an operating system (OS) in the memory unit 12, and executes a construction management program of the present disclosure stored in the memory unit 12.

[0032] The memory unit 12 includes a recording medium such as a read-only memory (ROM) and a random-access memory (RAM). The ROM stores various programs such as the OS, the construction management program, and a construction management database (DB) 18. The RAM is used as a work area for, for example, generation of various databases, transmission and reception of information, computation, and the like during execution of the construction management program.

[0033] The I/O 14 is connected to an input device and an output device (not illustrated), and is used to take processing information into the management server 4 and output the processing information from the management server 4 under the control of the processor 10.

[0034] The communication unit 16 performs communication with the information terminals 6 and communication with an information source (not illustrated) under the control of the processor 10. This communication may be either wireless or wired communication.

[0035] <Information Terminal 6>

The information terminals 6 can be classified into a manager terminal 20 and a plurality of worker terminals 22 (= worker terminals 22-1, 22-2,..., 22-n) according to their assigned functions. The manager terminal 20 is assigned to a manager in charge of construction management, and each worker terminal 22 is assigned to a person in charge of carrying out construction work. The manager is, for example, a company, a person, or the like having the management authority among a plant owner and a partner company in charge of regular repair work and inspection.

[0036] The manager terminal 20 includes a processing unit 202, an information input/presentation unit 204, and the like in a device housing. The processing unit 202 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 204 includes an information input unit such as a keyboard and a touch sensor installed on a screen unit 206. The screen unit 206 presents construction/inspection management information including equipment information and drawing information related to construction work/inspection under the control of the processor.

[0037] Similarly, the worker terminal 22 includes a processing unit 222, an information input/presentation unit 224, and the like in a device housing. The processing unit 222 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 224 is used for information input such as information selection, and information presentation. As with the manager terminal 20, a screen unit 226 presents instruction information and the like related to construction work/inspection.

[0038] <Network 8>

The network 8 constitutes a communication medium between the management server 4 and the information terminals 6. For example, a public line may be used as the communication medium, but the communication medium is not limited to the public line.

[0039] <Construction Management DB 18>

FIG. 2 illustrates an example of the construction management DB 18. An overall plant

folder 24 is set in the construction management DB 18. The overall plant folder 24 is an example of a first data storage unit.

[0040] The overall plant folder 24 is an example of a DB section that stores the entire contents of construction information of all plants in a construction/inspection ordering office. The overall plant folder 24 is provided with a first plant folder 24-1 relevant to a first plant classified from all the plants, a second plant folder 24-2 relevant to a second plant classified from all the plants,..., and other plant folders. That is, construction information of the first plant is stored in the first plant folder 24-1, and construction information of the second plant is stored in the second plant folder 24-2.

[0041] A plurality of construction request form folders 26-1, 26-2,... are associated with the first plant folder 24-1. The construction request form folder 26-1 stores construction request form information of a plant section belonging to the first plant. The construction request form information includes position information, drawing information 28-1, and construction information indicating individual request contents of construction work. The position information is information indicating a position of construction work or inspection. The drawing information 28-1 is information represented by drawings such as an isometric drawing and a spool drawing illustrating equipment such as piping at a construction point. The construction information is information indicating construction and inspection contents at the construction point.

[0042] Similarly, the construction request form folder 26-2 stores construction request form information on a different construction place of the plant section belonging to the first plant. This construction request form information also includes position information, drawing information 28-2, and construction information indicating individual request contents of construction work. Since these contents have been described above, the description thereof will be omitted.

[0043] A construction specification folder 30 and a construction estimate/plan folder 32 are created from the storage information in the construction request form folders 26-1, 26-2,.... The construction specification folder 30 stores construction specification information specified by the construction points associated with the construction request form folders 26-1, 26-2,.... The construction estimate/plan folder 32 stores construction plan information together with estimate information at the construction points associated with the construction request form folders 26-1, 26-2,....

[0044] A construction management table folder 34 and a construction list folder 36 are set in the construction management DB 18. The construction management table folder 34 and the construction list folder 36 are examples of a second data storage unit.

[0045] The construction management table folder 34 stores a construction management table 35 that is automatically generated under the control of the processor 10 in response to uploading of the construction information to the construction management DB 18. That is, management information in which the overall plant information, the plant information, the construction request form information, and the drawing information are associated is automatically generated, and stored in the construction management table folder 34.

[0046] The construction list folder 36 stores a construction list table 37, and log information of the construction information based on the construction request form information stored in the construction request form folders 26-1, 26-2,..., and the like.

[0047] <Drawing Information 28-1>

FIGS. 3A to 3C illustrate drawings included in the drawing information 28-1 and a relationship between the drawings. FIG. 3A illustrates an example of an overall plant diagram, FIG. 3B illustrates an example of a plant diagram, and FIG. 3C illustrates an example of a construction/inspection instruction diagram.

[0048] As illustrated in FIG. 3A, an overall plant diagram 38 is a plant diagram illustrating an overall plant of a refinery office that is a construction/inspection ordering source on a reduced scale, and is a plan view illustrating the overall plant. In the overall plant diagram 38, Ax represents, for example, an instruction range of a construction/inspection relevant point. The instruction range Ax can be specified in any shape, and is, for example, a range including a construction/inspection target.

[0049] As illustrated in FIG. 3B, the plant diagram 40 is a plant diagram illustrating the construction/inspection target, and is a partially enlarged plan view of the instruction range Ax selected from the overall plant diagram 38 of FIG. 3A. In the plant diagram 40, Bx represents, for example, a construction/inspection instruction range. The instruction range Bx can be specified in any shape, and is, for example, a construction/inspection target range.

[0050] As illustrated in FIG. 3C, the construction/inspection instruction diagram 42 is a construction/inspection instruction diagram instructed to the construction/inspection target, and is an isometric drawing illustrating the details of a construction/inspection point in this example. The construction/inspection instruction diagram 42 illustrates construction/inspection instruction contents together with piping/machinery as the construction/inspection target. A straight portion and a bent portion in the drawing indicate a piping form. Note that the construction/inspection instruction diagram 42 does not illustrate instruction information, which will be described later, among the construction information.

[0051] As described above, the drawing information 28-1 includes the overall plant diagram (FIG. 3A), the plant diagram (FIG. 3B), the construction/inspection instruction diagram (FIG.

3C), and the like. Therefore, the location of the office, the entire image, and the like can be recognized from the overall plant diagram (FIG. 3A), the location and the like of construction work/inspection in the plant can be recognized from the plant diagram (FIG. 3B), and the construction/inspection instruction contents can be grasped from the construction/inspection instruction diagram (FIG. 3C).

[0052] Although not illustrated, other pieces of the drawing information 28-2,... also include the overall plant diagram 38, the plant diagram 40, and the construction/inspection instruction diagram 42 similarly to the drawing information 28-1, and the relationship between the drawings is as described above.

[0053] <Construction Management Table 35>

The construction management table 35 stores the management information in which the overall plant information, the plant information, the construction request form information, and the drawing information are hierarchically associated, and the construction point is associated with the overall plant based on the position information of the plant.

[0054] The construction management table 35 stores the construction management information, and includes an overall information section, a plant section, a construction request form number section, and a drawing number section. The overall information section stores equipment information indicating the overall plant such as "... refinery". The plant section stores information indicating each plant belonging to the "... refinery", such as the first plant or the second plant selected from the "... refinery". The construction request form number section stores number information for specifying a construction request form. The drawing number section stores number information for identifying a drawing such as an isometric drawing in which the construction point is deployed.

[0055] According to the construction management table 35, the position information of the plant in the overall plant information is associated using the stored management information, and each piece of information can be recognized based on the position information.

[0056] <Construction List Table 37>

The construction list table 37 stores order information, inspection work information, and the like specified by the construction request form.

[0057] A construction request form number section, an order form section, an inspection work section, and a link section are set in the construction list table 37. The construction request form number section stores number information for specifying the construction request form.

[0058] The order form section stores identification information indicating an order form. An inspection section and an incidental work section are set in the order form section. The inspection section stores identification information identifying inspection contents. The

incidental work section stores identification information identifying an order form of incidental work.

[0059] The inspection work section stores identification information such as an inspection work name for specifying inspection work, for example. The link section stores related information such as link destination information specified by the number information of the construction request form.

[0060] According to the list information stored in the construction list table 37, the order form, the inspection work name, the link destination, and the like of the construction work specified by the construction request form number can be specified and confirmed.

[0061] <Processing Procedure of Construction/Inspection Preparation Process>

FIG. 4 illustrates a processing procedure of a construction/inspection preparation process. This processing procedure is an example of a construction management method or a program for construction management of the present disclosure.

[0062] This processing procedure includes, as the processing procedure in the construction/inspection preparation process, generation of the construction management DB 18 (S101), generation of the folders 24, 34, and 36 (S102), drawing selection (S103), input of the position information (S104), determination of completion of the drawing selection (S105), and the like.

[0063] In preparation for the construction work/inspection, the management server 4 generates a framework of the construction management DB 18 (S101). Based on the generation of the construction management DB 18, the management server 4 generates the overall plant folder 24, the construction management table folder 34, and the construction list folder 36 described above (S102).

[0064] After this processing, the drawing selection is performed (S103). The drawing selection is performed based on the drawing number from the drawing information. The position information is input to the selected drawing (S104). The drawing selection and the input of the position information are executed until all the drawing selections are completed, and it is determined whether all the drawing selections and the inputs of the position information have been completed (S105). When all the drawing selections and the inputs of the position information are completed (YES at S105), this process is terminated. With this process, the construction request form number and the drawing information are associated with each other.

[0065] <Process of Selecting Plant Diagram and Inputting Position Information>

FIG. 5 illustrates the selection of the plant diagram and the input of the position information. For example, the drawing information 28-1 includes a plurality of plant diagrams 40-1, 40-2,..., 40-n. The plant diagrams 40-1, 40-2,..., 40-n correspond to different plant

positions included in the overall plant diagram 38.

[0066] Each of the plant diagrams 40-1, 40-2,..., 40-n is selected according to each construction point, and has position information indicating the position of the construction point. Therefore, the position information corresponding to each of the plant diagrams 40-1, 40-2,..., 40-n is input to the overall plant information representing the overall plant diagram 38. As a result, the overall plant diagram 38 is associated with the plant diagrams 40-1, 40-2,..., 40-n.

[0067] <Processing Procedure of Construction Plan>

FIG. 6 illustrates a processing procedure of a construction plan. This processing procedure is an example of a construction management method or a program for construction management of the present disclosure.

[0068] This processing procedure includes selection of the construction request form number (S201), calling of the construction/inspection instruction diagram 42 (S202), selection of an inspection method (S203), selection of incidental work (S204), calling of the plant diagram 40 (S205), input of the plant position information to the plant diagram 40 (S206), presentation of a construction specification list table 97 (FIG. 12) (S207), and the like.

[0069] A construction plan input screen 60 (FIG. 7A) is used to input construction plan information. The construction plan input screen 60 is presented, for example, on the information presentation screen of the manager terminal 20. The construction request form information is output to the construction plan input screen 60, and a desired construction request form number is selected by inputting the construction request form number (S201). As a result, the management server 4 receives the construction request form number and specifies the construction request form from the construction request form number. The construction/inspection instruction diagram 42 associated with the construction request form number is called (S202), and a construction/inspection instruction screen 62 is presented.

[0070] The inspection method to be performed at the construction/inspection point specified in the construction/inspection instruction diagram 42 can be selected on the construction/inspection instruction screen 62 (FIG. 7B) (S203). After or at the same time as the selection of the inspection method, the incidental work can be selected on the construction/inspection instruction screen 62 (S204). When the selection of the inspection method and the incidental work is completed, the construction/inspection instruction screen 62 is changed to a construction/inspection content presentation screen 64 (FIG. 8A).

[0071] After the selection of the incidental work, the plant diagram 40 (= 40-1, 40-2,..., 40-n) having the construction point specified in the construction/inspection instruction diagram 42 is called (S205). After this calling, the plant position information is input onto the plant diagram 40 (S206). As described above with reference to FIG. 5, the instruction of a construction range

can be expanded to any range on the plant diagram 40.

[0072] Based on input of construction/inspection instruction information, the construction specification list table 97 (FIG. 12) for confirming construction specifications can be created under the control of the management server 4, and can be presented on a construction specification list presentation screen 96 (FIG. 12) (S207). As a result, the specification information of the construction work/inspection can be confirmed.

[0073] <Construction Plan Input Screen 60>

FIG. 7A illustrates an example of the construction plan input screen 60. The construction plan input screen 60 is presented on, for example, the manager terminal 20, but may be displayed on the worker terminal 22 for an authorized worker to input the construction plan.

[0074] A drawing display section 66, an inspection method selection section 68, and an incidental work selection section 70 are laid out and presented on the construction plan input screen 60.

[0075] Any one of the overall plant diagram 38, the plant diagram 40, or the construction/inspection instruction diagram 42 (FIG. 3), which has been called, among the drawing information is presented on the drawing display section 66.

[0076] When the construction/inspection instruction diagram 42 is selected, the inspection method selection section 68 and the incidental work selection section 70 are presented. The inspection method selection section 68 is provided with inspection buttons 68-1, 68-2, 68-3, 68-4, and 68-5 for selecting a specific inspection method from a plurality of inspection methods. In addition, the incidental work selection section 70 is provided with construction buttons 70-1, 70-2, 70-3, 70-4, and 70-5 for selecting a specific incidental work from a plurality of incidental works.

[0077] The inspection button 68-1 is a button used to select an ultrasonic test (UT). The inspection button 68-2 is a button used to select a radiographic test (RT). The inspection button 68-3 is a button used to select visual inspection. The inspection buttons 68-4 and 68-5 are buttons used to select another inspection such as ultrasonic scanning.

[0078] The construction button 70-1 is a button used to select thermal insulation work. The construction button 70-2 is a button used to select substrate treatment. The construction button 70-3 is a button used to select coating work. The construction button 70-4 is a button used to select installation of a scaffold assembly. The construction button 70-5 is a button used to select installation of a stepladder.

[0079] Priority operation is given to the drawing display section 66, the inspection method selection section 68, and the incidental work selection section 70. When the drawing information is presented on the drawing display section 66, the input of either or both of the

inspection method selection section 68 and the incidental work selection section 70 is permitted.

[0080] <Construction/Inspection Instruction Screen 62>

FIG. 7B illustrates the construction/inspection instruction screen 62. The construction/inspection instruction screen 62 is a screen obtained by presenting the construction/inspection instruction diagram 42 on the construction plan input screen 60. When the construction/inspection instruction screen 62 is presented, identification information 72 for identifying the construction/inspection instruction diagram 42 is generated. The identification information 72 is presented in the construction/inspection instruction diagram 42 on the construction/inspection instruction screen 62. The identification information 72 indicates the construction request form number, and is information for associating the construction/inspection instruction diagram 42 with the construction request form number.

[0081] As described above, on the construction/inspection instruction screen 62, the inspection method selection section 68 and the incidental work selection section 70 are maintained in active state, so that the inspection method and the incidental work can be selected and input.

[0082] An input content confirmation button 74 is presented at the bottom of a display area of the construction/inspection instruction diagram 42. The input content confirmation button 74 is used to confirm the input contents of the inspection method or the incidental work associated with the construction/inspection instruction diagram 42 being presented.

[0083] <Construction/Inspection Content Presentation Screen 64>

FIG. 8A illustrates the construction/inspection content presentation screen 64. The construction/inspection content presentation screen 64 is a presentation screen showing an inspection symbol representing an inspection position and an inspection content, and a construction symbol representing an incidental work position and an incidental work content, which are being input or have been input, on the construction/inspection instruction screen 62.

[0084] The construction/inspection content presentation screen 64 is provided with the inspection symbol, the construction symbol, and color. The inspection symbol, the construction symbol, and the color are examples of association between the position information specified on the drawing information and the construction information, and instruction information indicating the association. “UT”, “RT”, “visual”,... are examples of the inspection symbol.

[0085] “UT” is an inspection symbol representing the execution of the “ultrasonic test” and its position, “RT” is an inspection symbol representing the execution of the radiographic test and its position, and “visual” is an inspection symbol representing the execution of the visual inspection and its position. Numbers given to the inspection symbols are reference numbers.

[0086] “Th”, “Su”, “Co”, “Pf”, and “St” are examples of the construction symbol. “Th” represents “Thermal Insulation”, “Su” represents “Substrate”, “Co” represents “Coating”, “Pf”

represents “Scaffold Assembly”, and “St” represents “Stepladder”.

[0087] <Inspection Symbol, Construction Symbol, and Color Mark>

FIG. 8B illustrates an example of the inspection symbol, the construction symbol, the color mark, and their positions given to the construction/inspection instruction diagram 42 on the construction/inspection content presentation screen 64. A position Cx with the construction symbol and the color mark indicates a position where the incidental work is performed.

[0088] <Construction Symbols and Color Marks>

FIG. 8C illustrates an example of the construction symbols and the color marks.

A blue color mark is given to the construction symbol “Th”, a purple color mark to the construction symbol “Su”, an orange color mark to the construction symbol “Co”, a green color mark to the construction symbol “Pf”, and a pink color mark to the construction symbol “St”, whereby the contents of the construction work are distinguished by the symbols and colors.

[0089] In consideration of the construction symbols and the color marks, it is possible to recognize the contents of the incidental work based on the construction symbols and to distinguish the contents based on the colors.

[0090] <Selection of Inspection Method>

FIG. 9 illustrates a processing procedure of the selection of the inspection method (S203) in the processing procedure of the construction plan (FIG. 6).

[0091] This processing procedure includes selection determination of the inspection method (S301), pasting of the inspection symbol (S302, S303), size input (S304, S305), photographing (S306, S307), input of the inspection contents (S308, S309), confirmation of the input contents (S310, S311), determination of selection completion of the inspection method (S312), and automatic creation of the construction management table 35 (S313).

[0092] When the process of selecting the inspection method (S203 in FIG. 6) is started, any one of the pasting of the inspection symbol (S302, S303), the size input (S304, S305), the photographing (S306, S307), and the input of the inspection contents (S308, S309) can be selected in the case of the selection of the inspection method (YES at S301), and the confirmation of the input contents (S310, S311) can be selected not in the case of the selection of the inspection method (NO at S301).

[0093] When any one of the inspection buttons 68-1, 68-2, 68-3, 68-4, and 68-5 is selected (YES at S301), and the pasting of the inspection symbol is selected (YES at S302), the inspection symbol is pasted to a corresponding point on the construction/inspection instruction diagram 42 (S303). When the size input is selected (YES at S304), the size input is executed (S305). When the photographing is selected (YES at S306), the photographing is executed (S307). When the input of the inspection contents is selected (YES at S308), the inspection

contents based on the operation of any one of the inspection buttons 68-1, 68-2, 68-3, 68-4, and 68-5 are input (S309).

[0094] The confirmation of the input contents (S310, S311) is selected not in the case of the selection of the inspection method (NO at S301). When the confirmation of the input contents is selected (YES at S310), an input content confirmation table 76 showing the input contents is created and presented on an input content presentation screen 75 (FIG. 11) (S311), so that the construction/inspection method can be confirmed from the input content confirmation table 76.

[0095] Subsequently, it is determined whether the selection of the inspection method has been completed (S312). When the selection of the inspection method is not completed (NO at S312), the process returns to S301, and steps S301 to S312 can be repeated.

[0096] When the selection of the inspection method is completed (YES at S312), the process moves to the automatic generation of the construction management table 35 (S313). After the construction management table 35 is created by the automatic generation, this process is terminated, and returns to S203 (FIG. 6).

[0097] <Selection of Incidental Work>

FIG. 10 illustrates a processing procedure of the selection of the incidental work (S204) in the processing procedure (FIG. 6).

[0098] This processing procedure includes selection determination of the incidental work (S401), pasting determination of the construction symbol (S402), pasting of the construction symbol (S403), association with the inspection method (S404), input determination of the construction contents (S405), input of the construction contents (S406), confirmation of the input contents (S407), presentation of the input content confirmation table 76 (S408), determination of input completion of the incidental work (S409), and automatic creation of the construction management table 35 (S410).

[0099] When the process of selecting the incidental work (S204 in FIG. 6) is started, the pasting of the construction symbol is determined (S402) in the case of the selection of the incidental work (YES at S401). When the pasting of the construction symbol is selected (YES at S402), the construction symbol is pasted to a corresponding point on the construction/inspection instruction diagram 42 (S403), and the pasting of the construction symbol and the inspection method are associated with each other (S404). It is determined whether to input the construction contents (S405).

[0100] If the pasting of the construction symbol is not selected (NO at S402), the process proceeds to S405 by skipping S403 and S404 from S402, and the input of the construction contents is determined (S405). When the input of the construction contents is selected (YES at S405), the construction contents are input (S406). The input of the construction contents is

input of the contents of the incidental work described above.

[0101] When the selection of the incidental work is not performed at S401 (NO at S401), it is determined whether to confirm the input contents (S407). When the confirmation of the input contents is selected (YES at S407), the input content confirmation table 76 is presented on the input content presentation screen 75 (FIG. 11) (S408).

[0102] Subsequently, it is determined whether the input of the incidental work has been completed (S409). When the input of the incidental work is not completed (NO at S409), the process returns to S401, and steps S401 to S409 can be repeated.

[0103] When the input of the incidental work is completed (YES at S409), the process moves to the automatic generation of the construction management table 35 (S410). After the construction management table 35 is created by the automatic generation, this process is terminated, and returns to S204 (FIG. 6).

[0104] <Input Content Presentation Screen 75>

FIG. 11 illustrates an example of the input content presentation screen 75 on which the input content confirmation table 76 is presented. The input content presentation screen 75 is presented on the information input/presentation unit 204 of the manager terminal 20 or the information input/presentation unit 224 of the worker terminal 22. The input content confirmation table 76 presented on the input content presentation screen 75 can be presented during or after information input concerning the construction work/inspection, or at any time, and is used to confirm the input information.

[0105] The input content confirmation table 76 stores item information and content information thereof used to confirm the input contents, and includes an inspection number section 78, a size section 80, an inspection method section 82, a thermal insulation work section 84, a substrate treatment section 86, a coating section 88, a scaffold assembly section 90, a stepladder section 92, and a remark section 94.

[0106] The inspection number section 78 stores an identification number and the like for specifying the inspection method. The size section 80 stores size information of a drawing to be presented or the like. The inspection method section 82 stores inspection information such as the selected inspection method, its inspection position, its inspection level, and the presence or absence of scan processing.

[0107] The thermal insulation work section 84 stores instruction information of thermal insulation work, such as a thermal insulation point, a thermal insulation content, and the presence or absence of temporary thermal insulation. The substrate treatment section 86 stores substrate treatment information indicating the presence or absence of substrate treatment and its level, such as a polishing grade. The coating section 88 stores coating information such as a coating

material and grade. The scaffold assembly section 90 stores scaffold assembly information such as the presence or absence of scaffold assembly installation, the scale, and the size. The stepladder section 92 stores stepladder information such as the necessity of a stepladder. The remark section 94 stores, for example, attention information related to the inspection and the construction work.

[0108] <Construction Specification List Presentation Screen 96>

FIG. 12 illustrates an example of the construction specification list presentation screen 96 on which the construction specification list table 97 is presented. The construction specification list presentation screen 96 is presented on the information input/presentation unit 204 of the manager terminal 20 or the information input/presentation unit 224 of the worker terminal 22.

[0109] A list presentation section 98, an overall diagram output button 100, and an output selection button 102 are set in the construction specification list presentation screen 96. The list presentation section 98 is a presentation area for the construction specification list table 97. The overall diagram output button 100 is an operation button for outputting the overall plant diagram 38. The output selection button 102 is an operation button for selecting output of link information.

[0110] The construction specification list table 97 presented on the list presentation section 98 can present list information related to the construction work/inspection, and is used to confirm the input construction specification information.

[0111] The construction specification list table 97 stores a construction management section 104 and an input content confirmation section 106, in which the input contents and the construction management information are stored in association with each other. A plant diagram selection section 108, a drawing number section 110, and an inspection work name section 112 are set in the construction management section 104.

[0112] The plant diagram selection section 108 stores plant diagram information to be selected through operation of the output selection button 102. The drawing number section 110 stores number information indicating a drawing number given to the overall plant diagram 38, the plant diagram 40, or the construction/inspection instruction diagram 42. The inspection work name section 112 stores identification information indicating an inspection work name.

[0113] The input content confirmation section 106 stores information common with the input content confirmation table 76. The storage information is denoted by the same reference numerals, and the description thereof will be omitted.

[0114] <Relationship between Construction Specification List Presentation Screen 96 and Link Information>

FIGS. 13A to 13D illustrate a relationship between the construction specification list presentation screen 96 and the link information. Based on this relationship, any one of the overall plant diagram 38, the plant diagram 40, and the construction/inspection instruction diagram 42 associated as the link information can be selected and output from the construction specification list presentation screen 96.

[0115] FIG. 13A illustrates a part of the construction specification list presentation screen 96. FIG. 13B illustrates the overall plant diagram 38 having a link relationship with the construction specification list presentation screen 96, FIG. 13C illustrates the plant diagram 40 having a link relationship with the construction specification list presentation screen 96, and FIG. 13D illustrates the construction/inspection instruction diagram 42 having a link relationship with the construction specification list presentation screen 96.

[0116] When the overall diagram output button 100 of the construction specification list presentation screen 96 is selected and operated, the overall plant diagram 38 is presented on the construction specification list presentation screen 96. The overall plant diagram 38 presents the plant diagram 40 showing the construction/inspection target, and the drawing information associated with the plant diagram 40.

[0117] The plant diagram 40 is selected and presented based on the plant diagram and the drawing number that are the drawing information associated with the overall plant diagram 38. The plant diagram 40 is the drawing information corresponding to the instruction range Ax indicating the construction/inspection position in the overall plant diagram 38.

[0118] The construction/inspection instruction diagram 42 is selected and presented by selecting the inspection work name from the presentation of the plant diagram 40. The construction/inspection instruction diagram 42 is the drawing information corresponding to the instruction range Bx indicating the construction/inspection position in the plant diagram 40.

[0119] When the output selection button 102 is selected and operated, the construction/inspection instruction information can be presented in the order of the construction specification list table 97, the construction/inspection instruction diagram 42, photograph information (not illustrated), and the like.

[0120] <Effects of First Embodiment>

According to the first embodiment, any one of the following effects can be obtained.

(1) In the construction management DB 18, all the information related to the construction work, the inspection, and the like, such as the equipment information, is stored in association with the construction position and the like, and shared. By using the construction management DB 18, the construction management information can be extracted extremely easily and quickly.

[0121] (2) The drawing information is aggregated into the overall plant diagram 38, the plant diagram 40, and the construction/inspection instruction diagram 42, and is associated based on the instruction information indicating the construction point. The specification information at the construction point can be acquired from any one of the overall plant diagram 38, the plant diagram 40, and the construction/inspection instruction diagram 42.

[0122] (3) All the construction work is managed using the construction management table 35, and the overall plant diagram 38, the plant diagram 40, or the construction/inspection instruction diagram 42 corresponding to the construction point can be reached from the construction management table 35.

[0123] (4) In the screen display, the construction information is aggregated into the construction plan input screen 60, the construction/inspection instruction screen 62, the construction/inspection content presentation screen 64, and the like, and the contents of the input content confirmation table 76 and the construction specification list table 97 can be presented on each screen.

[0124] (5) By presenting the construction specification list table 97 on the construction specification list presentation screen 96, the confirmation of the construction specifications, the confirmation of the construction point, and the contents of the construction/inspection instruction diagram 42 of the construction point can be simultaneously grasped and shared.

[0125] (6) By using such management information, it is possible to speed up the construction work/inspection, improve the work quality, and contribute to rationalization of the construction work and the inspection, such as work sampling.

[0126] SECOND EMBODIMENT

FIG. 14 illustrates a processing procedure of a construction plan according to a second embodiment. This processing procedure is an example of a construction management method or a program for construction management of the present disclosure.

[0127] This processing procedure includes a process of message input and output presentation in addition to the processing steps in the processing procedure (FIG. 6) described above. This processing procedure includes selection of the construction request form number (S501), calling of the construction/inspection instruction diagram 42 (S502), selection of the inspection method (S503), message input for the inspection method (S504), selection of the incidental work (S505), message input for the incidental work (S506), calling of the plant diagram 40 (S507), input of the plant position information to the plant diagram 40 (S508), presentation of the construction specification list table 97 (FIG. 12) (S509), and the like.

[0128] Since S501, S502, and S503 are similar to the processing procedure (S201, S202, S203) of the construction plan according to the first embodiment, the description thereof will be

omitted. In this processing procedure, message information can be input (S504), and presented on the construction/inspection content presentation screen 64 after the process of selecting the inspection method (FIG. 9) is completed. The message information is information such as an instruction concerning the inspection method.

[0129] Since S505, S507, and S508 are similar to the processing procedure (S204, S205, S206) of the construction plan according to the first embodiment, the description thereof will be omitted. In this processing procedure, message information can be input (S506), and presented on the construction/inspection content presentation screen 64 after the process of selecting the incidental work (FIG. 10) is completed. The message information is information such as an instruction concerning the incidental work.

[0130] In this embodiment, the message information input to the construction/inspection content presentation screen 64 is presented in the construction specification list table 97 at the time of presenting the construction specification list table 97 (S509), so that this information can be stored in the construction specification folder 30 as the construction specification information.

[0131] <Construction/Inspection Content Presentation Screen 64>

FIG. 15 illustrates an example of the construction/inspection content presentation screen 64 according to the second embodiment. The construction/inspection content presentation screen 64 illustrates an example of the message information presentation.

[0132] An inspection message section 114 and an incidental work message section 116 are set, and a message input button 118 is set in the construction/inspection instruction diagram 42 on the construction/inspection content presentation screen 64.

[0133] When the message input button 118 is selected and operated, the inspection message section 114 and the incidental work message section 116 are changed to active state. For example, character information as instruction information can be input to the inspection message section 114 or the incidental work message section 116 as the message information concerning the inspection method or the construction information.

[0134] In this embodiment, the message information is input using the construction/inspection content presentation screen 64. However, the inspection message section 114 and the incidental work message section 116 may be set and the message input button 118 may be presented on the construction/inspection instruction screen 62. Necessary message information may be input during the selection of the inspection method or the incidental work, stored in the construction specification folder 30, and called as necessary.

[0135] <Effects of Second Embodiment>

According to the second embodiment, any one of the following effects can be obtained.

(1) The inspection instruction information presented in the inspection message section

114 or the incidental work instruction information presented in the incidental work message section 116 can be presented on the manager terminal 20 or the worker terminal 22 to be easily shared and recognized.

[0136] (2) It is possible to easily and quickly transmit the management information from the inspection message section 114 or the incidental work message section 116 to a construction/inspection site, which contributes to refinement of construction/inspection work.

[0137] OTHER EMBODIMENTS

Features and modifications of the embodiments described above will be listed below.

[0138] (1) Although the inspection and the incidental work 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.

[0139] (2) The construction management system 2 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.

[0140] (3) An information input or information presentation unit may be mounted in the management server 4, so that the construction management may be performed by a management company or a partner company.

[0141] According to the present disclosure, it is possible to share the construction information, speed up the construction work, improve the work quality, and the like by utilizing the construction management method, system, program, recording medium, device, and database using a computer, for the regular repair work and the inspection, thereby achieving a highly convenient construction system.

What is claimed is:

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

generating a database specified by equipment information, and storing, in the database, at least position information, drawing information, and construction information among the equipment information associated by management information;

specifying position information indicating an equipment position from the position information, and selecting drawing information specified by the position information from the drawing information; and

adding association between the position information specified on the drawing information and the construction information, and instruction information indicating the association, to the drawing information.

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

deploying the drawing information on an image presented on an information presentation unit;

accepting selection of the instruction information from the image, and reading at least the construction information specified by the equipment position from the database; and

presenting the construction information on the image.

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

writing message information into the drawing information on an image presented on an information presentation unit;

storing the message information in the database in association with the drawing information; and

presenting the message information together with the drawing information on the image.

4. The construction management method according to claim 1 or 2, wherein the construction information includes at least any one, or two or more of a construction plan, a construction content, and an inspection content.

5. A construction management system that manages construction work using a computer, the construction management system comprising:

a memory unit configured to store a database specified by equipment information, and store, in the database, at least position information, drawing information, and construction information among the equipment information associated by management information, for each piece of the equipment information;

a server configured to specify position information indicating an equipment position from the position information, select drawing information specified by the position information from the drawing information, add association between the position information specified on the drawing information and the construction information, and instruction information indicating the association, to the drawing information, and store the drawing information in the database; and

an information terminal including an information presentation unit configured to present at least any one, or two or more of the position information, the drawing information, and the construction information.

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

a function to generate a database specified by equipment information, and store, in the database, at least position information, drawing information, and construction information among the equipment information associated by management information, for each piece of the equipment information;

a function to specify position information indicating an equipment position from the position information, and select drawing information by the position information; and

a function to add association between the position information specified on the drawing information and the construction information, and instruction information indicating the association, to the drawing information, and store the drawing information in the database.

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

a function to deploy the drawing information on an image of an information presentation unit;

a function to accept selection of the instruction information from the image, and read at least the construction information specified by the equipment position from the database; and

a function to present the construction information on the image of the information presentation unit.

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

a function to write message information into the drawing information on an image presented on an information presentation unit;

a function to store the message information in the database in association with the drawing information; and

a function to present the message information together with the drawing information on the image.

9. A recording medium storing any one, or two or more of the database included in the construction management method according to any one of claims 1 to 4, the database included in the construction management system according to claim 5, and the program according to any one of claims 6 to 8.

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

a device housing;

a memory unit configured to store a database specified by equipment information, and store, in the database, at least position information, drawing information, and construction information among the equipment information associated by management information, for each piece of the equipment information;

a processing unit configured to specify position information of an equipment position from the position information, select drawing information by the position information, add association between the position information specified on the drawing information and the construction information, and instruction information indicating the association, to the drawing information, and store the drawing information in the database; and

an information presentation unit configured to present at least any one, or two or more of the position information, the drawing information, and the construction information,

wherein two or more of the memory unit, the processing unit, and the information presentation unit are mounted in the device housing.

11. A database that is specified by equipment information, the database comprising:

a first data storage unit configured to store at least position information, drawing information, and construction information among the equipment information associated by management information, for each piece of the equipment information; and

a second data storage unit configured to store the management information.