New Function of Graphic Operation Terminal "GOT2000 Series"

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Mitsubishi Electric's programmable human-machine interfaces are designed to deliver high performance and reliability, plus the convenience of advanced and unique linkage functions for customers using Mitsubishi factory automation (FA) devices. As a result, the product line is highly evaluated both in Japan and overseas. In view of the growing demand for remote monitoring and maintenance, we recently developed the GOT Mobile function, a solution that uses mobile terminals.

1. Overview

We call programmable human-machine interfaces Graphic Operation Terminals (GOTs). The GOT Mobile function has been developed to allow monitoring and maintenance from mobile terminals based on data information received via the GOT.

Since the release of the initial GOT series, we have continuously upgraded its remote monitoring/maintenance solutions. However, the following issues needed to be resolved.

Issue 1: There are cases in which a GOT cannot be used for remote monitoring/maintenance in a plant, or its use is limited.

Issue 2: The use of a GOT requires the installation of dedicated software on the customer's terminal (PC, etc.), which may make it difficult to introduce the system.

The GOT Mobile function was developed to solve these issues. Figure 1 shows a schematic view of the function (usage concept).

The GOT Mobile function for remote monitoring and maintenance uses Web technologies. By accessing the GOT Web server from a Web browser running on a PC or mobile terminal, devices can be independently monitored and data information can be operated via the browser on each terminal as done on the GOT. Screens for the mobile terminals are created using GOT engineering software, MELSOFT GT Works3. This enables GT Works3 experts to easily create a screen for a mobile terminal.

2. Features and Applied Technologies

2.1 Simultaneous connection/independent operation of multiple terminals

When performing monitoring or maintenance from a remote location, the operator may display or operate data information different from that viewed at the working site. Also, the data information collected from the plant facilities by a GOT may be used as Andon display information.

With the existing solutions, if monitoring or maintenance is performed by multiple persons, a separate GOT for this purpose is required at the work site, or the monitoring/maintenance must be performed
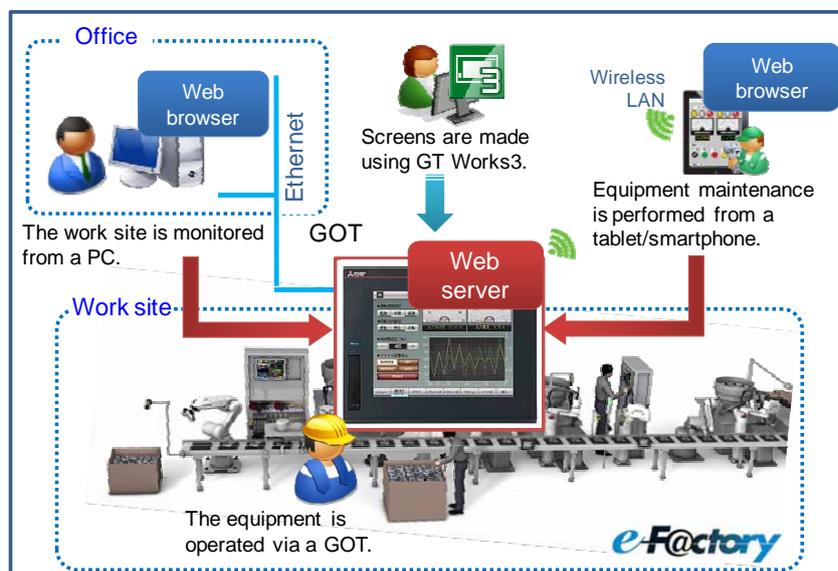

Fig. 1 Overview of GOT Mobile function

when the fixture GOT is not being used at the site. If an Andon display system is installed, another dedicated GOT is needed.

To streamline such GOT use and reduce the number of devices needed, the GOT Mobile function allows the simultaneous connection of multiple mobile terminals to a GOT and an independent screen display for each terminal (Fig. 2).

This function manages the connection status of the mobile terminals connected to a GOT and allows each connected terminal to monitor equipment independently. When operations are performed on the terminals, the information is transmitted to the GOT and is received as independent operations of each terminal.

The GOT uses its internal memory (internal storage device) to retain the information necessary for operation control of the GOT itself, such as the status of monitoring target devices and operation target screen numbers. Upon receiving information on a change in the status or operation performed involving a monitoring target, the GOT updates its internal storage device, and if necessary, updates the screens and the data transmitted and received from connected devices as well.

The GOT Mobile function has a mechanism in which a virtual internal storage device called a GOT Mobile device is used for each mobile terminal, thereby allowing simultaneous connection and independent operation of multiple terminals. More specifically, a section of the GOT's internal storage device is allocated to connected mobile terminals as a GOT Mobile device for each terminal to independently manage the data

information of each terminal.

Figure 3 shows the operation concept when a VGD0, which is one of the GOT Mobile devices, is set to each mobile terminal as the screen changeover device (VGD0: Virtual GOT Data Register #0).

While an example of setting the display screen numbers is shown in the figure, we have adopted a mechanism for managing all data information of each terminal as an independent GOT Mobile device. If the status of the monitoring target changes, the corresponding GOT Mobile device is updated and an update notification is transmitted to the mobile terminals. When an operation notification is transmitted from a mobile terminal, the GOT Mobile device managed by each terminal is updated, and any necessary processes are performed. This has also enabled the simultaneous connection and independent operation of multiple terminals.

2.2 Screen display on Web browsers

We have also developed a mechanism that displays the screens on a Web browser to allow equipment monitoring and data information operation without needing to install a dedicated application. Many companies have introduced restrictions on installing software on information devices and require complicated in-house procedures; instead, a widely-used Web-based solution overcomes the obstacles to introducing the GOT system.

The browser screen display uses standard Web technologies such as Hypertext Markup Language 5
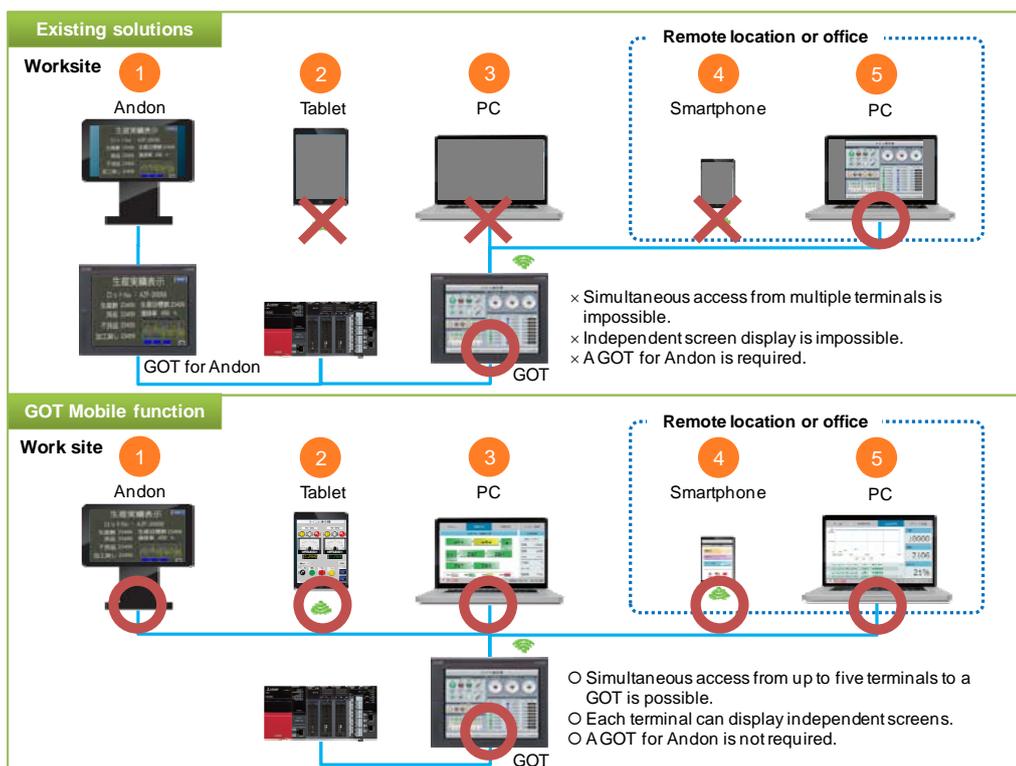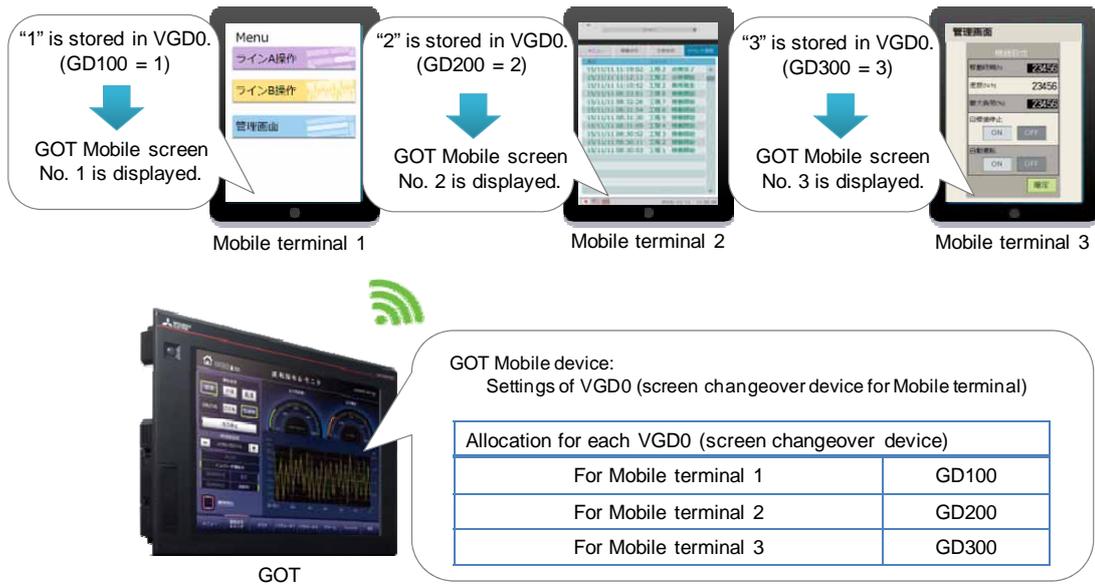

Fig. 2 Connection of multiple mobile device

Fig. 3 Example of GOT Mobile device setting for screen transition

(HTML5), Cascading Style Sheets 3 (CSS3), and JavaScript.

2.3 Creation of screens for mobile terminals

The screens displayed using a Web browser are to be created by GT Works3. This is usually done by Web engineers or by using software designed for Web pages. For the GOT Mobile function, screen creation is done by the functional extension of GT Works3, screen creation software for GOTs. This eliminates the need for experience with HTML and other Web technologies. Furthermore, existing screens for the GOT itself can be used.

3. Conclusion

This article described the characteristics and applied technologies of the GOT Mobile function which was newly developed to widen the scope covered by remote solutions. Going forward, we will continue to improve the GOT Mobile function and the linkages with our FA devices. We will also promote solutions provided by product groups and services.

Reference
(1) Kawai H., et al.: New Model and Function of Graphic Operation Terminal "GOT2000 Series," Mitsubishi Denki Giho, 90, No. 4, 235-238 (2016)