

# MELSEC iQ-R Engineering Environment and Integrated Monitoring System for Process Control

Authors: Akira Tsubone\* and Masahira Ikeda\*

To meet the evolving requirements of the process automation market, we have developed the MELSEC iQ-R process CPU, which facilitates the advanced process control function and greatly improves its performance together with the features for process control of the programmable logic controller engineering environment GX Works3 and SCADA (supervisory control and data acquisition) software MC Works64. This report introduces the features for process control of GX Works3 and MC Works64.

## 1. Features for Process Control of GX Works3

In the conventional programmable controller engineering environment, it was necessary to perform programming by using two separate tools (Process control: PX Developer, Electrical control: GX Works2) suitable for each control type. Therefore, in defining and managing the labels (tags), compiling programs and downloading programs to the programmable controller, the use of two tools complicated the process and created a problem. To solve this problem, GX Works3 integrated the process control and the electric control into one tool, which eliminated the complex operation and reduced the programming hours (Fig. 1).

In the process control, it is necessary to describe the logic that continuously processes the analog value

including the PID loop control. A suitable programming language for describing such logic is the FBD language of the IEC61131-3 standard. However, the FBD language is not suitable for describing logic that combines complicated AND/OR logic operation in ON/OFF status such as for an interlock circuit. Thus, GX Works3 allows a mixed description of ladder language components such as contacts or coils in the FBD language compliant with IEC61131-3 (Fig. 2).

In GX Works3, the process control tag FB was added as a library to easily achieve advanced control in the process control system like a PID loop equipped with cascade control or feedforward control (Fig. 3). Operation of these process control tag FBs can be changed by setting the detailed properties. Therefore, usage of the process control tag FB has made programming of advanced process control logic easily available.

The process control tag FB can also provide a popup display of the faceplate. This allows a visual check for operation of the program. In addition, GX Works3 contains not only the faceplate, but also the process control tag tuning tool with the standard screens such as a tuning panel, trend graph, etc. generally used in tuning the process control tag. After preparing the program, process control tag tuning can immediately be performed using this tool. Thus, the hours required for engineering can be reduced.

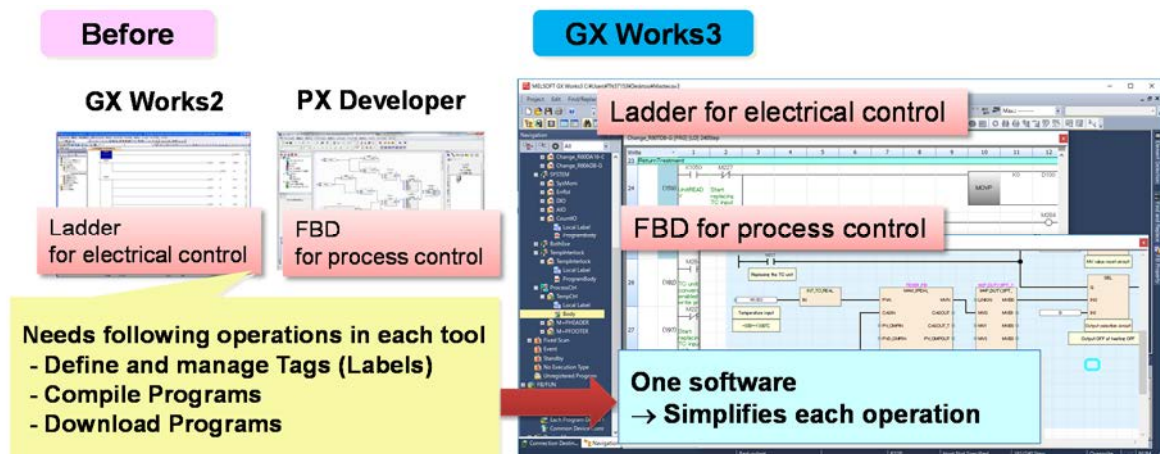


Fig. 1 Integrated engineering tool

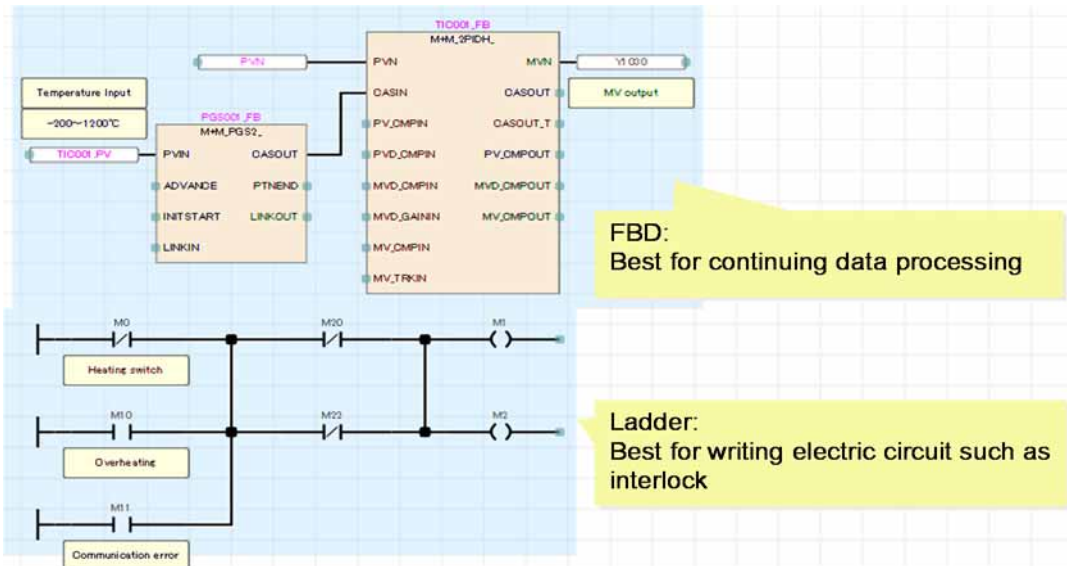


Fig. 2 New FBD editor

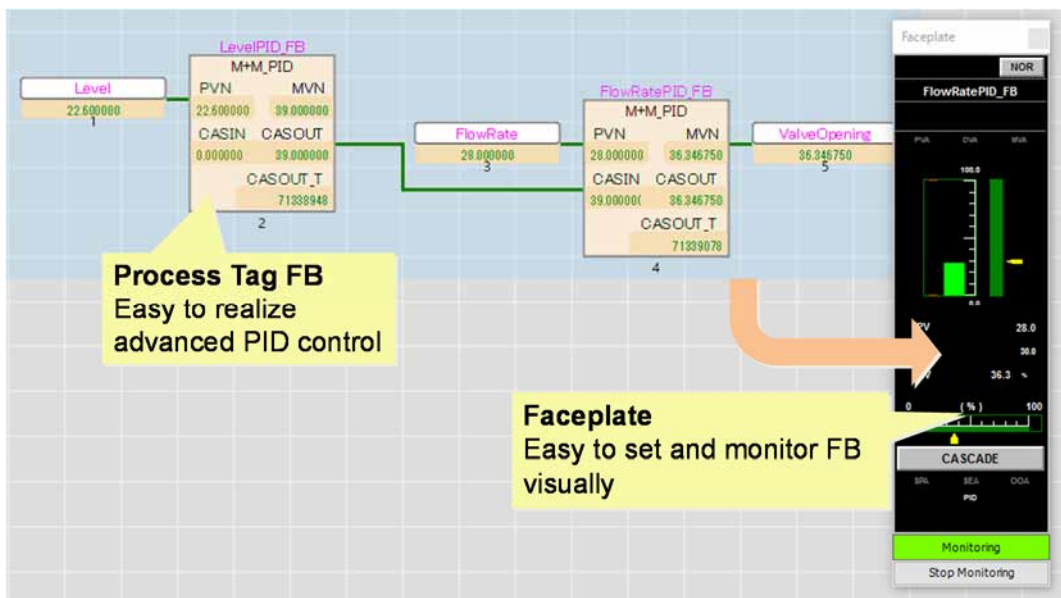


Fig. 3 Process Tag FB and Faceplate

## 2. MC Works64

MC Works64 is SCADA software that establishes the integrated monitoring system and has been used in a wide range of fields, especially the manufacturing industry. MC Works64 has excellent functions such as high-definition graphics display, mobile display, and cloud support. However, the process control monitoring encountered several problems including the availability of a standard screen suitable for monitoring and managing the process control tags, instantaneous notification of important data changes including alarms, and ease of communication settings. The functions developed to solve these problems are described below.

MC Works64 has the auto generating function of monitoring screens as a standard unit that facilitates establishment of the integrated monitoring system. With this function, monitoring screens can automatically be

generated according to the device for monitoring by using the registered template screen.

A faceplate and tuning panel for monitoring and managing the process control tags and for parameter tuning were newly added as the template screen (Fig. 4).

This allows saving of screen creation for monitoring and managing the process control tags.

MC Works64 communicates with our PLC (programmable logic controller) with the OPC server function. Conventionally, this function has supported only polling type communication, which requests data from the programmable logic controller at constant intervals. However, in polling type communication, if there is a particularly large number of monitoring points, then important event notifications such as alarms or mode changes on the process control system may be delayed.

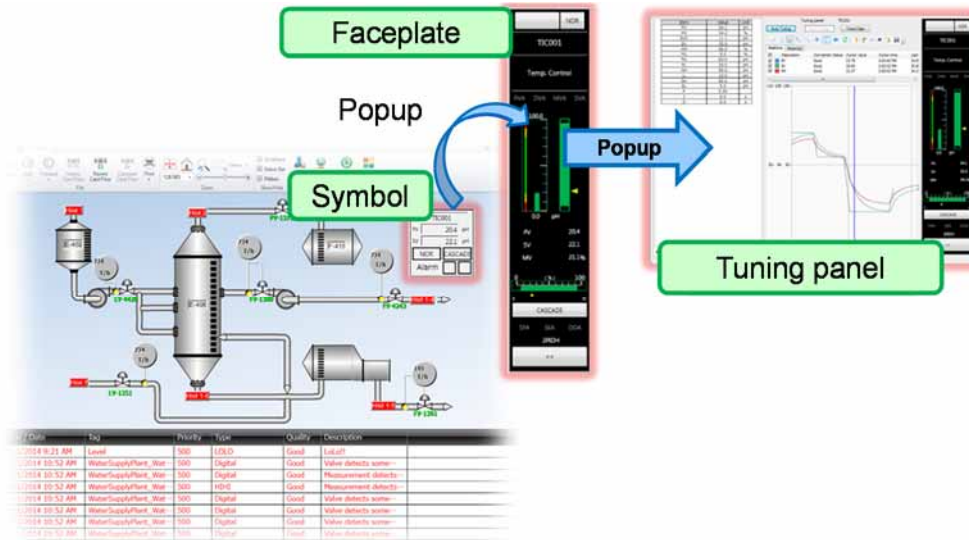


Fig. 4 Screen image of Faceplate for Process Tag

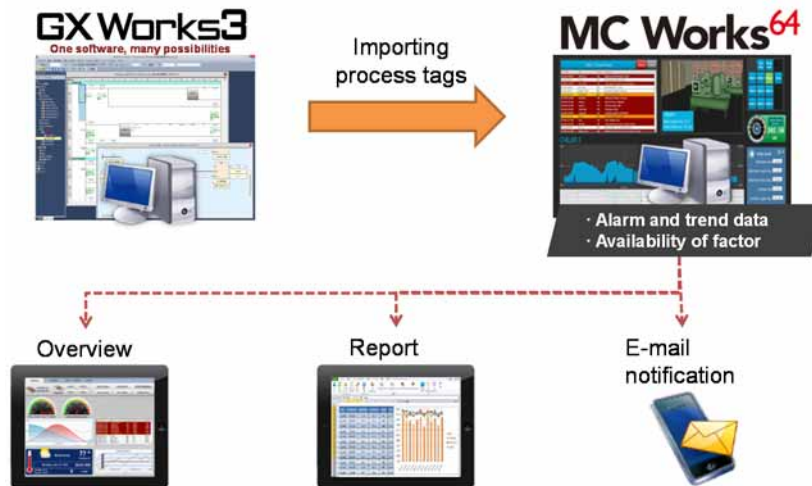


Fig. 5 Importing process tags and remote monitoring with mobile devices

Therefore, our process control tag FB has an event notification function that transmits the applicable tag information from the iQ-R process CPU to the server upon the occurrence of an event. By adding the event receiving function to this OPC server function, MC Works64 is able to instantaneously detect an important event.

To monitor the process control tags with MC Works64, tag communication setting, alarm setting and data logging setting are required. If the number of process control tags increases, the workload of these settings becomes larger. Therefore, a function was developed that takes the process control tag definition data from the project created with GX Works3 and incorporates it in each setting in MC Works64. This reduces the workload of the setting on MC Works64.

MC Works64 also has a function that analyzes device operation based on data collected from the programmable controller, and a function that provides alarm/trend information using a mobile device, displays the analysis results in a graph/list, outputs the report and sends notification by e-mail. The combination of these

functions with the incorporation of the process control tag definition data previously described allows operation analysis using the incorporated measurement data, and remote monitoring of the analysis results and the process control related data (alarms, trends, etc.) easily using a mobile device (Fig. 5) in the process control monitoring system.

### 3. Conclusion

This report introduced GX Works3 and MC Works64 compatible with the MELSEC iQ-R process CPU. We will listen to many opinions of customers and will continue to develop and provide a product which realizes attractive quality.

### Reference

- (1) Tsubone A., et al.: Instrumentation Engineering Environment and Integrated Supervisory System for "MELSEC iQ-R Series," Mitsubishi Denki Giho 91, No. 4, 221-224 (2017).