FUJITSU

Mitsubishi Heavy Industries, Ltd.
Development of a visualization system leveraging IoT for aircraft components production
Accelerating the shift toward smart factories by introducing IoT to aircraft production

Fujitsu Limited (headquartered in Minato-ku Tokyo; president and representative director, Tatsuya Tanaka; hereafter referred to as Fujitsu) has developed a system for visualizing operation status, progress, and failures in production equipment by leveraging IoT technology to provide highly-efficient production lines that were sought by production sites at the commercial aircraft divisions of Mitsubishi Heavy Industries, Ltd. (headquartered in Shinagawa-ku Tokyo; president and CEO, Shunichi Miyanaga; hereafter referred to as Mitsubishi Heavy Industries). This system collects information on the operation status of production equipment at Mitsubishi Heavy Industries into a cloud system securely through a private network, visualizes production status in a timely manner, and notifies persons in charge about problems and delays when they occur. It had taken several hours to centralize information through multiple systems and through checking onsite to understand the operation status, progress, and equipment failures at sites. The system allows these information to be understood in a timely manner and in an integrated way, greatly reducing the man-hours for operation management as well as the time taken to give instructions and initiate countermeasures regarding equipment failures once they occur.

In the future, Mitsubishi Heavy Industries will gradually add production status analysis feature and a failure prediction feature, and will apply the system to other relevant processes, thus expanding the range of highly-efficient production lines that leverage IoT.

In the development of this system, the project adopted the COLMINA Platform provided as a cloud service by Fujitsu in order to start operating the system in a short time. In addition to this, the project has adopted a User Experience (UX) design approach to achieve visualizations that can allow users to intuitively notice problems and take countermeasures.

Background

Mitsubishi Heavy Industries manufactures commercial aircraft products. In some processes of the production, it takes several hours to several dozen hours to manufacture the products by machinery. Therefore, the stable operation of equipment is a crucial factor in production sites. With production sites like these, it is necessary in both sites and offices to swiftly and accurately understand what is happening, what work is in progress, and what problems are occurring.

With regard to these issues, Mitsubishi Heavy Industries considered solutions leveraging IoT and verified the visualization of independent transport devices utilizing the cloud in order to measure the effectiveness of IoT installation with low cost and for a short time. As a result, Mitsubishi Heavy Industries saw a good outlook for achieving highly-efficient production lines by leveraging IoT and came to install a full-scale system.

System overview

The production equipment monitoring system developed this time for Mitsubishi Heavy Industries aims to monitor, ensure, communicate, and manage the health of production as well as to investigate the causes of failures. As the first step toward this target, the system automatically acquires the positions of products, independent transport devices, and jigs and visualizes equipment operation status and the progress of production.

This system has the following three features:

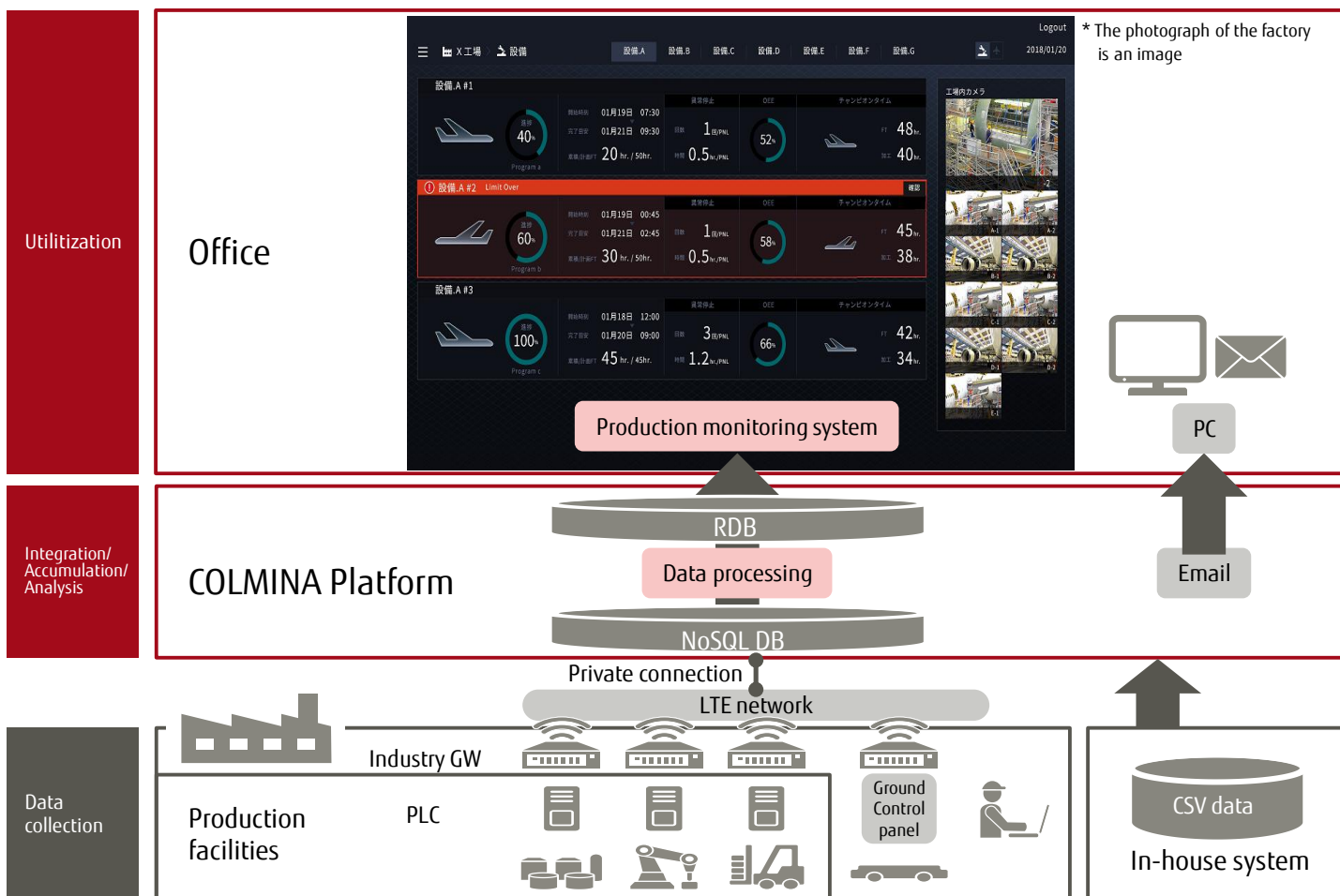### 1. Accurately understanding results by acquiring information from equipment

- By acquiring result information from equipment directly instead of entering this information by hand as it was done conventionally, the system can now acquire more accurate progress information and utilization rates instantly.

- This enables the narrowing down of locations to be improved, leading to an increase in the capacity utilization rate, and the optimal allocation of personnel.

2. Achieving visualizations that allow users to gain insight intuitively

- The project has adopted a UX design approach, extracting requirements through interviews with users and verifying through demonstration videos based on how the system will be used at the site.

- By issuing alarms and sending email messages to persons in charge when equipment problems occur or when work is behind schedule, the system enables users to understand the situation in a timely fashion and to take countermeasures swiftly.

- During development, the project designed the screens using the visualization tool, Intelligent Dashboard, which allowed to build a consensus with users smoothly.

3. Small start and scalability

- By using the COLMINA Platform provided as a cloud service, it was able to develop the system in as short as four months starting with requirements definition and ending with the release.

- By leveraging open APIs and mechanisms for data accumulation and utilization, it was able to make a small start, gradually adding equipment to be connected and linking them with the system while verifying their effectiveness, and it will be able to proceed with visualizations over the whole factory as well as across factories.

- The centralization of equipment and business operation data makes it easy to analyze data and utilize these data for other business operation.

shaping tomorrow with you

Utilitization

Office

Production monitoring system

* The photograph of the factory is an image

PC

Integration/ Accumulation/ Analysis

COLMINA Platform

RDB

Data processing

NoSQL DB

Email

Private connection

LTE network

Data collection

Industry GW

Production facilities

PLC

Ground Control panel

CSV data

In-house system

<Production equipment monitoring system>

Outlook for the future

Mitsubishi Heavy Industries started the full-scale operation of this system in Nagoya Aerospace Systems Works from spring 2018. In the future, the company will gradually add a production status analysis feature and a failure prediction feature, and will apply the system to other relevant processes, thus achieving highly-efficient production lines that leverage IoT.

Fujitsu will play a role in the development and operation of this system in order to achieve further sophistication in the production equipment monitoring system in Mitsubishi Heavy Industries. In addition, we will apply our knowledge and expertise obtained through the development of this system to other business opportunities in order to promote IoT business in the industry field.

[Explanatory notes]

- COLMINA Platform: A cloud service provided by Fujitsu that receives and stores data on factories and maintenance sites and visualizes these data in order to enable users to accurately understand the state of manufacturing. Fujitsu aims to achieve Connected Industries through a Digital Place for Manufacturers - 'COLMINA'.

- UX design: UX (User Experience) refers to the feeling (experienced value) experienced by users when using a product or service. In recent years, the perception of value has been shifting toward "experience" in various areas, following the phrase "from tangibles to intangibles." Fujitsu has proposed Human Centric Experience Design, which is an expansion upon UX design, and has adopted this in system development.

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