

FACTORY AUTOMATION

TOTAL MAINTENANCE SOLUTIONS





Our Factory Automation business is focused on "Automating the World" to make it a better, more sustainable environment supporting manufacturing and society, celebrating diversity and contributing towards an active and fulfilling role.

Mitsubishi Electric is involved in many areas including the following:

Energy and Electric Systems

A wide range of power and electrical products from generators to large-scale displays.

Electronic Devices

A wide portfolio of cutting-edge semiconductor devices for systems and products.

Home Appliance

Dependable consumer products like air conditioners and home entertainment systems.

Information and Communication Systems

Commercial and consumer-centric equipment, products and systems.

Industrial Automation Systems

Maximizing productivity and efficiency with cutting-edge automation technology.

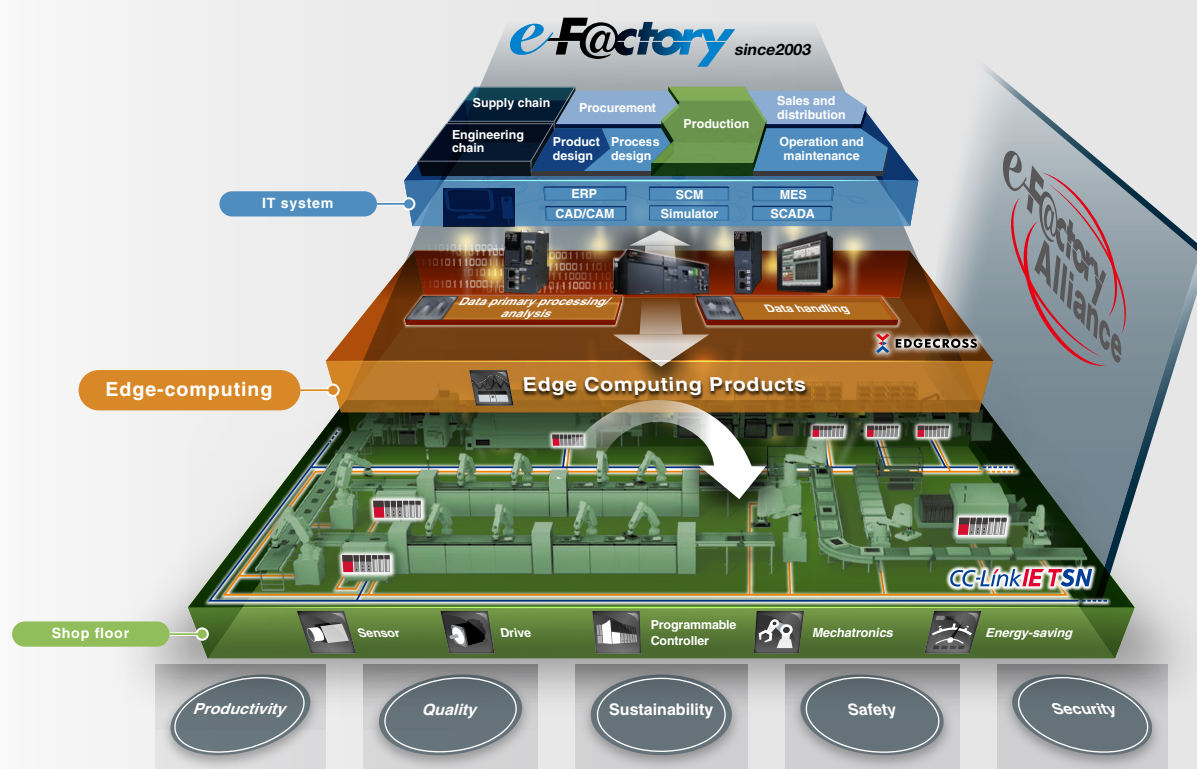


The Mitsubishi Electric Group is actively solving social issues, such as decarbonization and labor shortages, by providing production sites with energy-saving equipment and solutions that utilize automation systems, thereby helping towards a sustainable society.

FA-IT Integrated Solution



The “e-F@ctory” FA-IT integrated solution proposes ways of utilizing FA and IT technologies that reduce the total cost of development, production, and maintenance activities, continuously support customer KAIZEN activities, and promote monozukuri that is one step ahead.



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Total Maintenance Solutions

In today's dramatically changing business environment, the impact of sudden equipment downtime on corporate profits is enormous, and an increasing number of businesses are implementing planned equipment maintenance with the aim of achieving non-stop factories. Meanwhile, the manufacturing industry faces another major issue of passing down the expertise of highly experienced employees.

Current Issues



- Preventing equipment outages caused by sudden failure of parts with a set service life
- Reducing costs by using parts and tools to their respective limits
- Minimizing the impact on production of a problem by quickly and efficiently investigating the cause of the problem



After Introducing Total Maintenance Solutions



Maintenance work optimization with data management

A cartoon illustration of a man in a grey suit and blue tie, smiling and pointing upwards with his right hand. There are orange exclamation marks above him.

**Non-stop
operation
in factories**

**Planned
operations**

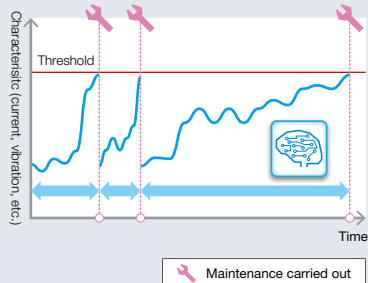
**Less
downtime**



What is Total Maintenance Solutions?

Total Maintenance Solutions comprise of "**Predictive Maintenance**", which prevents problems before they arise by detecting signs of abnormalities based on data collected, "**Preventive Maintenance**", which enables planned maintenance by managing data regarding operating times and frequencies, as well as "**Corrective Maintenance**", which shortens the time spent on cause investigation and ensures the early recovery of equipment by utilizing historical data. These are solutions that support our customers' maintenance activities in all phases and scales, whether it be lines, devices, or equipment.

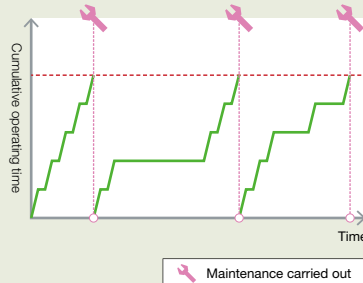
Predictive Maintenance



Prevents problems by detecting signs of abnormality by **analyzing operation data**



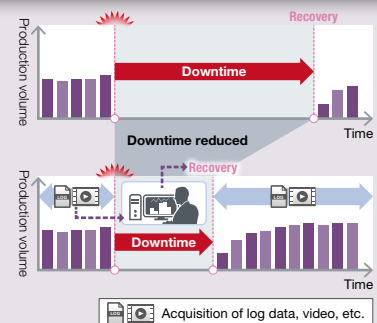
Preventive Maintenance



Operating time and frequency **data management** is utilized to prevent the generation of problems



Corrective Maintenance



Historical **data** utilized for detailed cause investigation and rapid recovery



Maisart, Mitsubishi Electric's AI technology, helps our customers achieve non-stop manufacturing.

Mitsubishi Electric's "compact AI" technology reduces operation loads and can be implemented on site.

Mitsubishi Electric's FA knowledge supports customers in applying AI technologies to their systems.

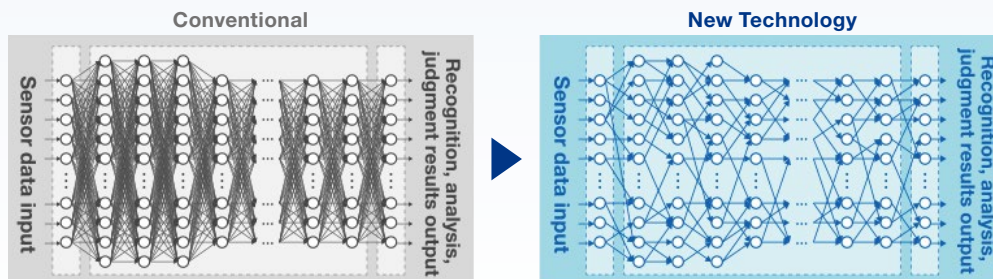
Mitsubishi Electric's edge-computing products simplify data collection and support the construction of AI systems.



Features

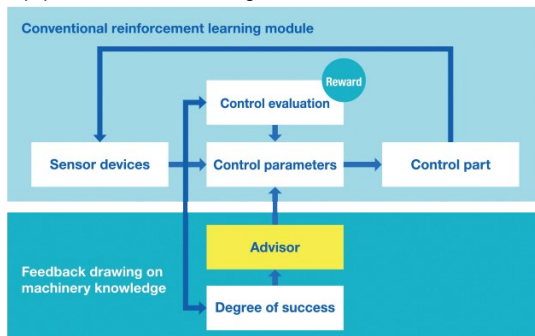
Deep Learning

Compared with conventional methods, our compact algorithms reduce deep learning layers by 1/30- 1/100.



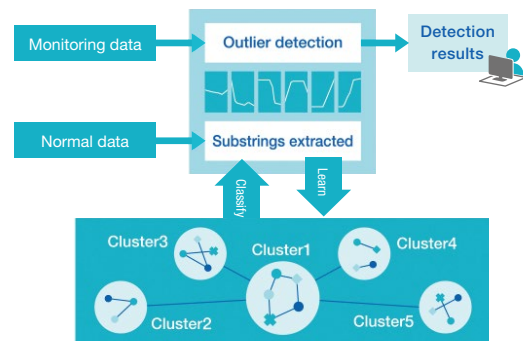
Reinforcement Learning

Reduces the number of pre-learning trials approximately 1/50 compared to conventional methods by estimating the degree of success through improving learning efficiency using equipment domain knowledge.



Big Data Analytics

Reduces the number of operations necessary to detect abnormal signs by 1/40 through streamlining time series data analysis using equipment domain knowledge.



Maisart is Mitsubishi Electric's brand of AI technology. The name stands for "Mitsubishi Electric's AI creates the State-of-the-ART in technology." This means that we are using our proprietary AI technology to make everything smarter.



Mitsubishi Electric, which combines solutions for shop floors and IT systems, offers solutions that meet customers' on-site challenges.

▼ Click the case you would like to see.

Case 1

Preventing defect outflow by understanding the tendency of molding defects

Predictive Maintenance
Device level

P. 08

Case 2

Detecting machining defects and preventing the outflow of defective products

Predictive Maintenance
Equipment level

P. 09

Case 3

Performing maintenance work on cylinders at the right time

Predictive Maintenance
Device level

P. 10

Case 4

Running laser-processing machines in continuous automatic operation

Predictive Maintenance
Equipment level

P. 11

Case 5

Detecting drive component age-related deterioration (ball screws, belts, gears)

Predictive Maintenance
Device level

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Case 6

Preventing the sudden failure of old equipment

Predictive Maintenance
Equipment level

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Case 7

Conducting maintenance before robots fail

Predictive Maintenance
Preventive Maintenance
Device level

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Case 8

Understanding when to replace servo amplifiers

Preventive Maintenance
Device level

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Identifying the cause of equipment errors

Corrective Maintenance
Equipment level

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Case 10

Responding to equipment problems without going to the shop floor

Corrective Maintenance
Equipment level

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Monitoring multiple lines from a remote location

Corrective Maintenance
Line level

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Restoring FA device programs on-site immediately

Corrective Maintenance
Equipment level

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Using robots reliably

Corrective Maintenance
Device level

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Case 14

Resolving inverter issues smoothly

Corrective Maintenance
Device level

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Case 1

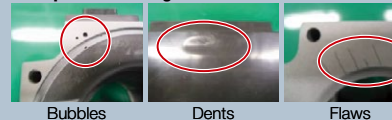
Device level

Predictive
MaintenancePreventive
MaintenanceCorrective
Maintenance

Preventing defect outflow by understanding the tendency of molding defects

The tendency of defects to appear in resin molding isn't well understood, leading to loss costs as the occurrence of continuous defects goes unnoticed.

Examples of molding defects



Bubbles

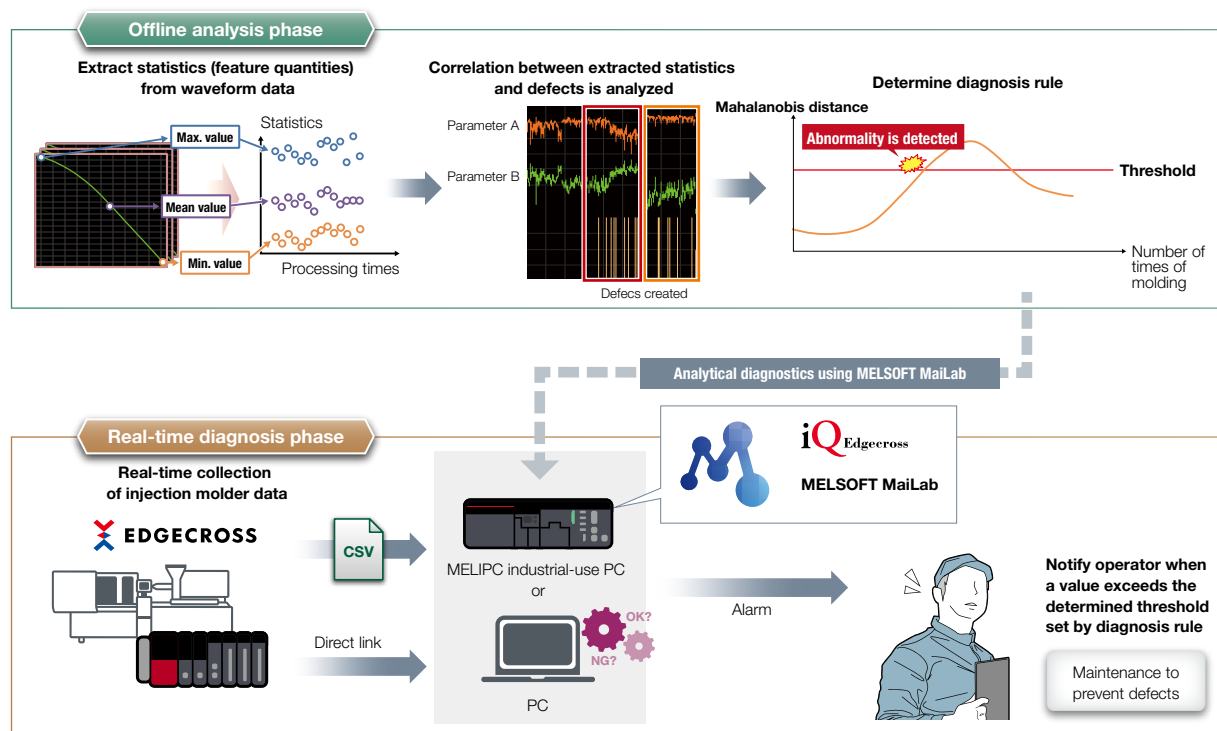
Dents

Flaws

Solution

Analyze and diagnose feature quantities to prevent plastic molding machine defects from continuously occurring

Using the data collected with MELIPC industrial-use PC in the MELSOFT Mailab (data analysis software), feature quantities from parameter waveform data that may affect molding quality are selected, the association with defects is analyzed, and diagnostic rules are created. By collecting molding machine data in real time with MELIPC and diagnosing it based on rules using MELSOFT Mailab, signs of molding defects are identified and maintenance can be performed before multiple defects occur.



The costs of losses due to waste is reduced by detecting signs of molding defects.

Product and Solution Introduction

► Data Science Tool MELSOFT Mailab P.34

► Industrial Computer MELIPC Series P.36

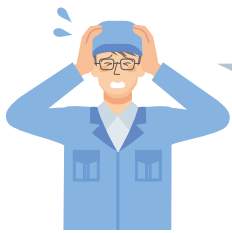
Case 2

Equipment level

Predictive Maintenance

Preventive Maintenance

Corrective Maintenance



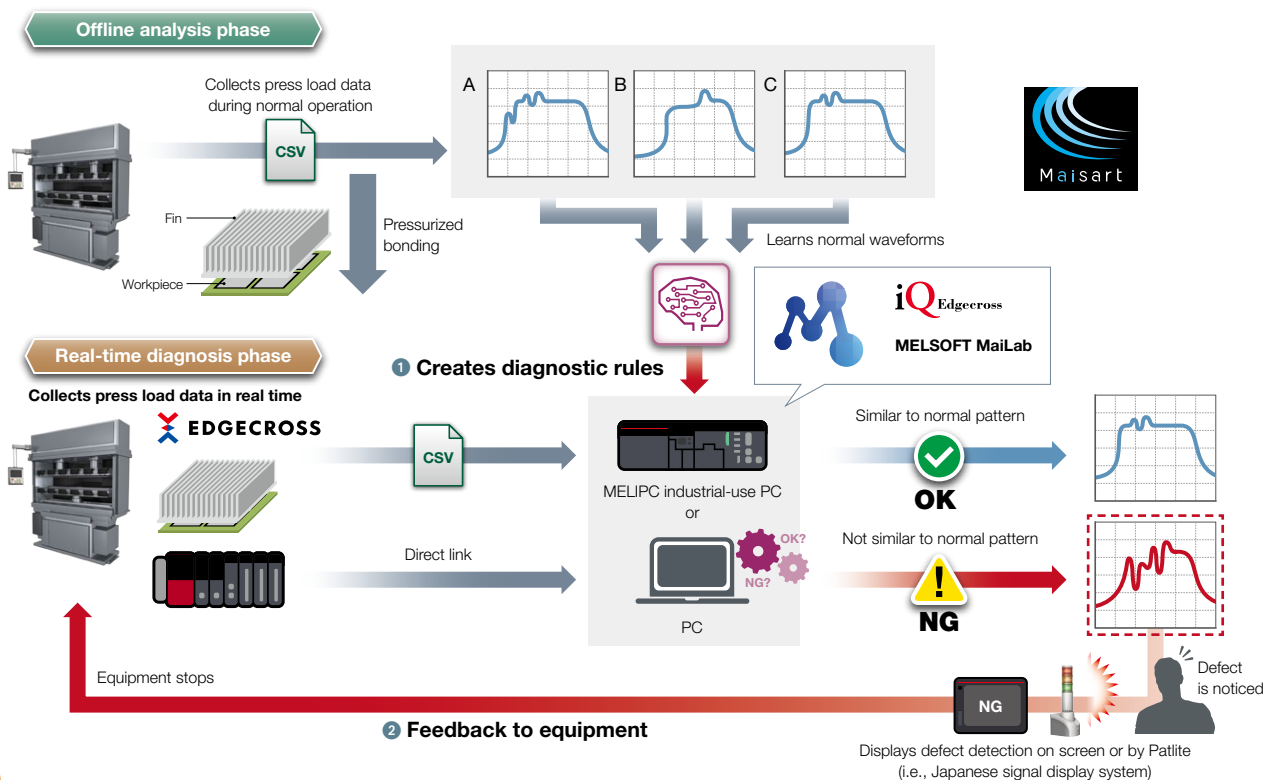
Detecting machining defects and preventing the outflow of defective products

The bonding in the metal fin caulking process is weak, leading to fins becoming detached due to defective bonding occurs in later processes.

Solution

Utilize AI to prevent bonding defects in the caulking process

Use the similar waveform recognition function of MELSOFT Mailab to create diagnostic rules by learning the waveform data of press loads during normal operation and correlating it with bonding defects. Press load data is collected in real time by the MELIPC industrial-use PC and then diagnosed based on rules using MELSOFT Mailab, allowing for bonding defects to be detected, which are then fed back to the equipment (causing equipment to stop).



Defect outflows to later processes are prevented through real-time detection of bonding defects.

Product and Solution Introduction

► Data Science Tool MELSOFT Mailab

P.34

► Industrial Computer MELIPC Series

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Case 3

Device level

Predictive
MaintenancePreventive
MaintenanceCorrective
Maintenance

Performing maintenance work on cylinders at the right time

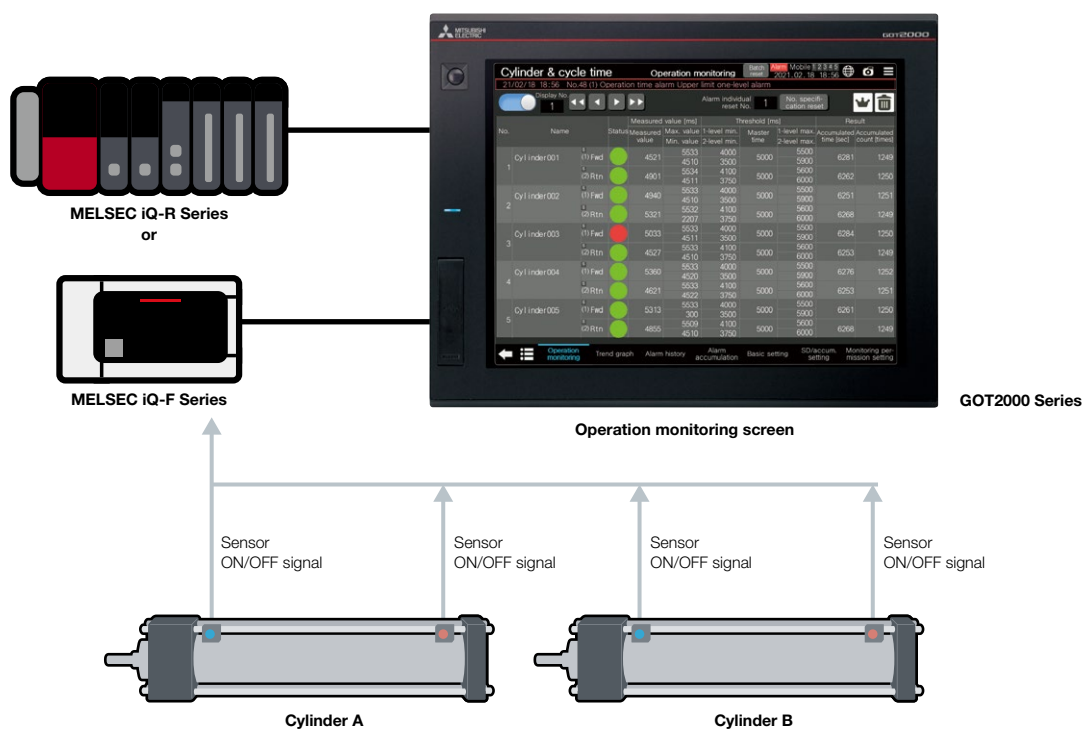
Delayed operation of the cylinder isn't noticed by operators, which leads to increased equipment cycle time.

Solution

Optimize maintenance by monitoring the cylinder operating time

The Cylinder and Cycle Time Monitor function of the e-F@ctory Starter Package measures and visualizes the cylinder operation time, automatically detects delays in the operating time caused by various factors (e.g., sticking due to dirt), and sounds an alarm.

This facilitates timely maintenance work without the need to rely on operator intuition and experience.



Prevents deterioration of the performance operating ratio and keeps production within the set tact time.

Product and Solution Introduction

► MELSEC iQ-R Series

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► MELSEC iQ-F Series

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► GOT2000 Series

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► e-F@ctory Starter Package

P.30

Case 5

Device level

Predictive
MaintenancePreventive
MaintenanceCorrective
Maintenance

Detecting drive component age-related deterioration (ball screws, belts, gears)

The status of drive component (ball screws, gears, belts) deterioration is unknown, so we can only respond after a failure, which requires considerable labor and cost.

Solution

Detect vibration and friction changes to predict the service life of mechanical parts

- ▶ The future vibration and friction torque of the ball screw (including bearings, guide, etc.) are estimated by Maisart, and a failure warning limit is automatically generated from the estimated information. Failures are predicted by alerting users when the limit is exceeded.
- ▶ The friction torque of the belt is estimated by Maisart, and any drop in the belt tension is monitored. Failures are predicted by alerting users when the limit is exceeded.
- ▶ The amount of gear backlash is estimated, and the frictional degradation of the gear is monitored. Failures are predicted by alerting users when the threshold value is exceeded.

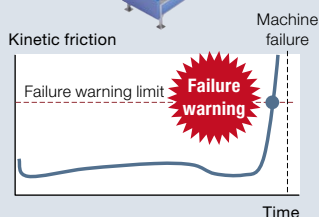
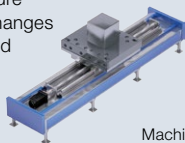


Monitor on
HMI (GOT) or PC

Ball screws

Failure prediction warning via
machine diagnosis function

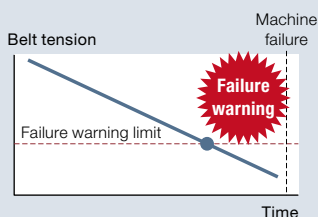
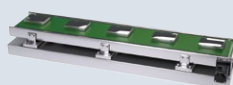
Predicts failure
based on changes
in friction and
vibration



Belts

Failure prediction warning via
machine diagnosis function

Detects drop in belt tension from
friction



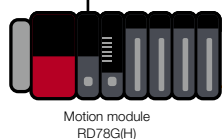
Gears

Monitoring with machine
diagnostic function

Monitors gear wear
using backlash
amount*

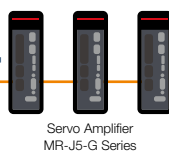


* This function can output warnings
by entering threshold values.



Motion module
RD78G(H)

CC-Link IE TSN



Servo Amplifier
MR-J5-G Series



Predicting the service life of mechanical parts reduces downtime and maintenance time, as well as improves equipment operating ratio, productivity, and quality.

Product and Solution Introduction

▶ MELSERVO-J5 Series

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Case 6

Equipment level

Predictive
Maintenance

Preventive
Maintenance

Corrective
Maintenance



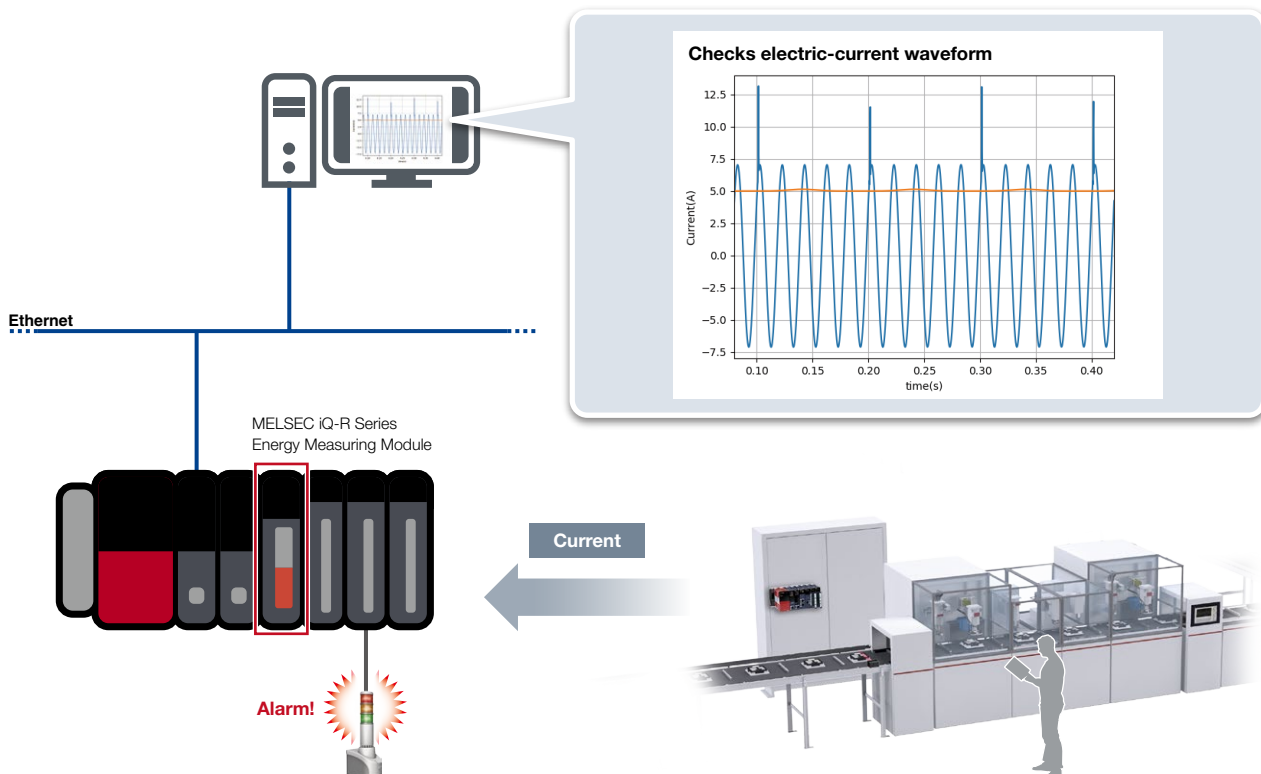
Preventing the sudden failure of old equipment

Sudden failures of equipment used for a long time results in unnecessary labor and costs.

Solution

Plan for equipment maintenance by monitoring current waveforms

The in-rush current waveform of equipment at the time of initial operation is measured in a short cycle of 10 ms to monitor any changes in electric-current waveform.



By detecting equipment failure
in advance through short cycle measurement,
maintenance planning is possible and labor costs are greatly reduced.

Product and Solution Introduction

► MELSEC iQ-R Series
Energy Measuring Module

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Case 7

Device level

Predictive
MaintenancePreventive
MaintenanceCorrective
Maintenance

Conducting maintenance before robots fail

Need to conduct scheduled maintenance appropriate with a robot's operational status.

Solution

Detect part faults and deterioration by utilizing AI, and notify users of the maintenance periods that are calculated from the operational status.

- ▶ Failing or deteriorating robot parts can be detected at an early stage.
- ▶ The recommended maintenance period can be calculated with the robot operation pattern data alone at an equipment startup.
- ▶ The repair/replacement period for each component is notified in advance, thus achieving efficient maintenance.

1 [Predictive Maintenance function] Fault detection

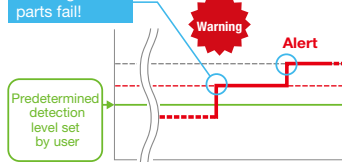
This function detects faults and robot component deterioration early on using only the robot controller. By detecting part faults before signs of faults appear in the robot's behavior, downtime can be reduced.

The threshold is set to suit each customer's environment. When the detection level is exceeded, a notification is sent to make the customer aware of part fault or deterioration.

It is possible to read scores (values) of a reduction gear and an encoder (data error and communication error)

It is possible to read log data of the past 365 days

Warning before parts fail!



Our proprietary AI technology extracts a characteristic waveform at high speed, based on accumulated machine data.

2 [Preventive Maintenance function] Maintenance simulation

The preventive maintenance function estimates the recommended maintenance period and when to replace consumable parts. This is done by observing repeat patterns in sample programs used by the robot or executed in the simulator in RT Toolbox3.

■ Output data

Grease replenishment period (per axis) / Timing belt replacement period (per axis) / Recommended maintenance period for overhaulable parts (per axis)*1

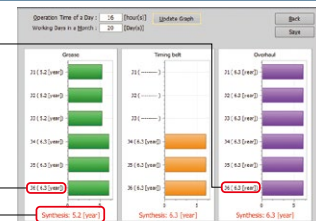
*1 For overhaulable parts such as reduction gears, bearings, ball screws, the internals of ball splines, the part which needs to be overhauled the earliest will be displayed.

[Maintenance simulation result]

Number of years until recommended overhaul period for joint

Number of years until part replacement for joint.

Number of years until part replacement (Joint with part that needs replacing earliest)



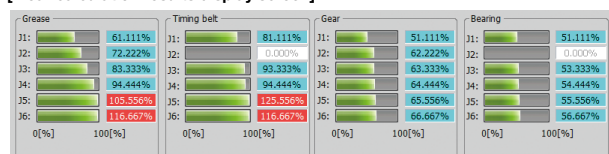
3 [Preventive Maintenance function] Wear calculation function

A function that calculates the wear of components*2 from the operational status (current, load, etc.) based on the robot's movements and posture. It also calculates the time left until inspection, maintenance and overhaul periods.

■ **Applicable parts: Consumable parts (grease, timing belts, etc.), overhaulable parts (reduction gears, bearings, ball screws, ball splines)**

*2 The wear ratio of each part is a reference value to assist the maintenance and inspection schedule calculated based on the robot's operational status. It does not guarantee that this is the actual remaining life of the part.

[Wear calculation results display screen]



The AI technology detects signs of failures, enabling maintenance before robots fail.
The recommended maintenance periods are simulated from the operation pattern, which helps users schedule maintenance properly.
The wear of robot parts is calculated from the operation pattern, and the maintenance periods are notified.

Product and Solution Introduction

▶ iQ Care MELFA Support

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▶ MELFA Smart Plus

P.41

Case 8

Device level

Predictive Maintenance

Preventive Maintenance

Corrective Maintenance



Understanding when to replace servo amplifiers

The sudden failure of servo amplifiers causes unexpected downtime.

Solution

Use the service life diagnosis for servo systems

Using the GOT Servo Amplifier Life Diagnosis function, it is possible to check the accumulated energization time of smoothing capacitors and the number of times the inrush relay has been turned on and off, therefore helping users understand when servo amplifiers need to be replaced.

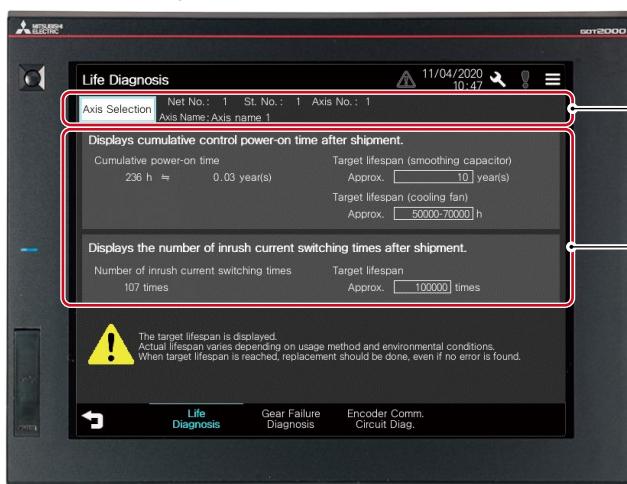
There are also functions for inverters and robots*1 to check when maintenance parts should be replaced.

Please refer to the [GOT2000 Series Product and Solution Introduction \(P. 28\)](#) for more information.

Amplifier life diagnosis screen*2



Periodic check



Maintenance for multiple axes can be performed on the same screen by switching the axis number

Check the smoothing capacitor energization time or the inrush relay on/off times at a glance

GOT Drive

*1 The degree of wear for each part is a reference value calculated from the operation status of the robot and is used for supporting the maintenance and inspection plan. It does not guarantee service life.

*2 Ready to use sample screens (VGA) are included in GT Works3. For the details, please contact your local sales office.



Planned maintenance is made possible by understanding the repair and replacement timing of servo amplifiers in advance

Product and Solution Introduction

► GOT2000 Series

P.28

► MELSERVO-J5 Series

P.37

Case 9

Equipment level

Predictive
MaintenancePreventive
MaintenanceCorrective
Maintenance

Identifying the cause of equipment errors

Identifying the cause of an error
by visually checking equipment is not possible as it looks in normal condition.
The video recorded with the camera runs too fast, making identifying the error cause difficult.

Solution

Investigate equipment error causes with a system recorder

The system recorder*¹ performs system-wide recording of equipment operation data and camera images in the event of an abnormality. Analysis is made easy by displaying waveform data, programs, and video data on the same timeline. Also, GX VideoViewer Pro analyzes the video footages and indicates areas different from normal operation (differences), and milestone points (log markers) are added automatically in the meantime.

*¹ System recorder: corrective maintenance solution that greatly reduces downtime through system-wide recording in the event of an abnormality and simplified analysis.

Identifying cause with Camera Recorder Module



Any causes of failures that were difficult to find before can be identified,
and errors that are likely to cause failures are avoided in advance.

Product and Solution Introduction

► System Recorder

P.24

► System recorder related software

P.26

Case 10

Equipment level

Predictive
Maintenance

Preventive
Maintenance

Corrective
Maintenance



Responding to equipment problems without going to the shop floor

When an abnormality occurs on the shop floor at another facility (overseas, etc.), it is difficult to accurately understand the cause by phone or e-mail alone. In order to investigate the cause and recover the shop floor to normal operations, it is necessary to go to the site where the problem is occurring, and this form of response is time-consuming and costly.

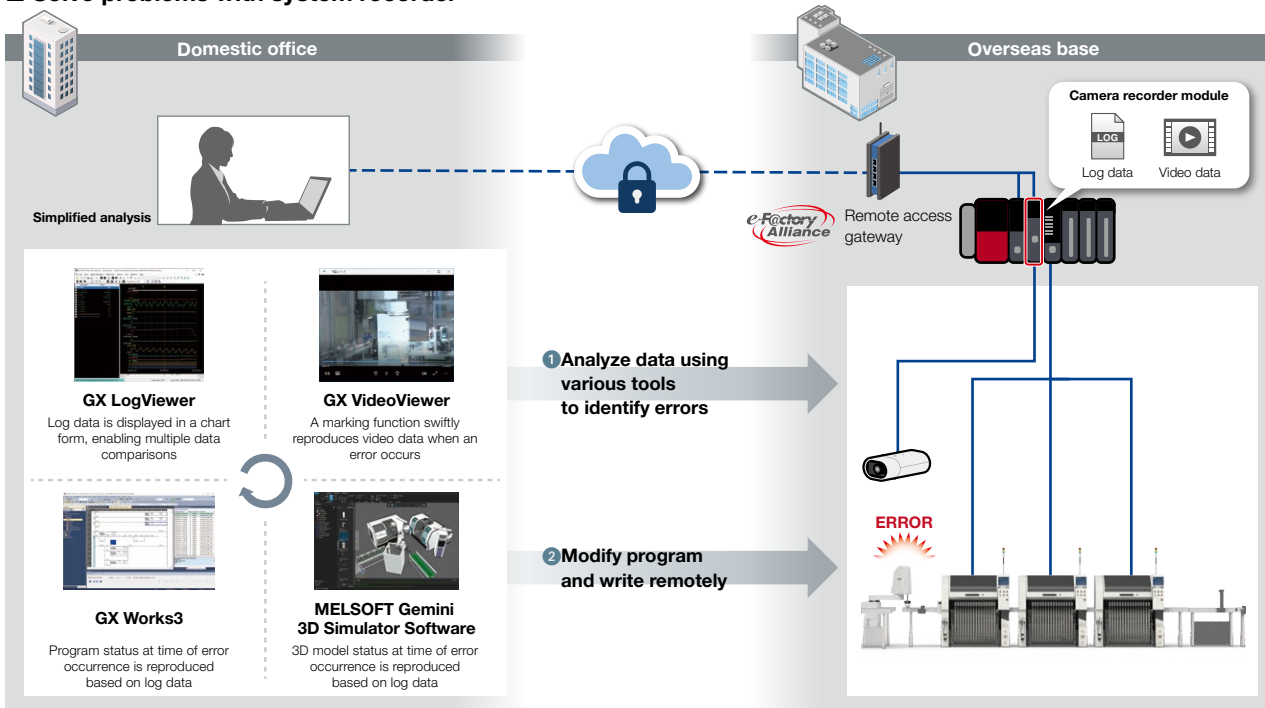
Solution

Confirm the status and error details of an equipment at a remote location via video images and 3D simulator, and thus the cause can be found quickly.

The system recorder*¹ performs system-wide recording of equipment operation data and camera images in the event of an abnormality. Waveform data, programs, and video data of the shop floor are obtained at remote locations, and operations can be confirmed through these data by linking 3D simulator and other tools. Remote environments are easily and securely built using Ewon/Secomea remote solutions.

*¹ System recorder: Corrective maintenance solution that greatly reduces downtime through system-wide recording in the event of an abnormality and simplified analysis.

■ Solve problems with system recorder



Labor hours and costs are significantly reduced by identifying error causes at an early stage from a remote location.

In addition to the video data, the 3D simulator is available to check operations and makes it possible to confirm operations of equipment blind spots or the inside of an equipment that cannot be seen physically.

Product and Solution Introduction

► System Recorder

P.24

► 3D Simulator MELSOFT Gemini

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►  HMS Ewon Cosy+ Series

P.46

►  Secomea SiteManager Series

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Case 11

Line level

Predictive
MaintenancePreventive
MaintenanceCorrective
Maintenance

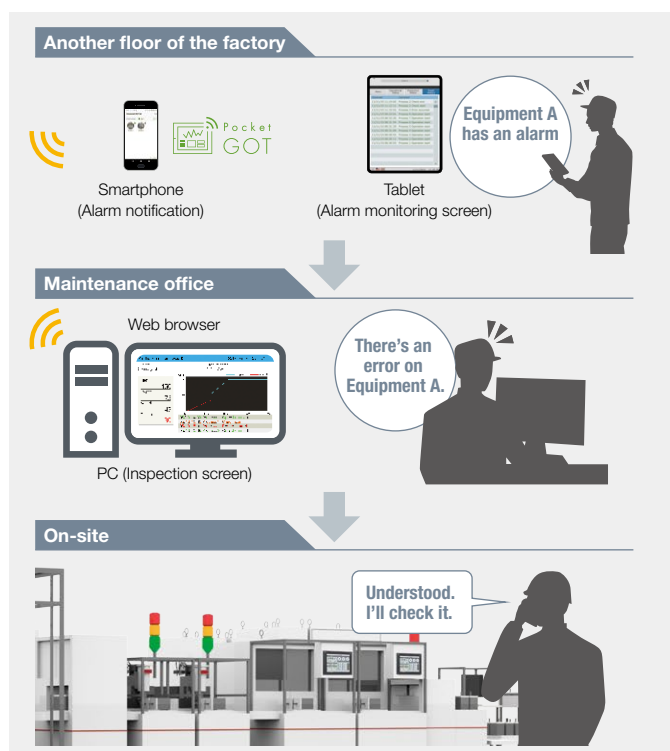
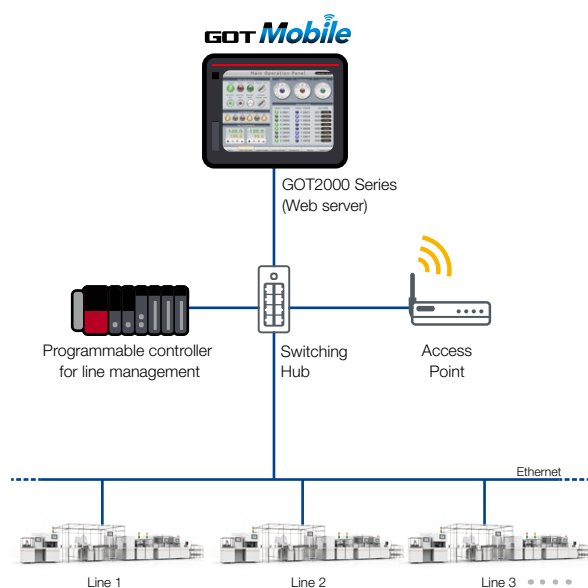
Monitoring multiple lines from a remote location

When managing multiple lines, it is necessary to switch back and forth between the lines when an error occurs, leading to prolonged downtime.

Solution

Remotely monitor of multiple lines

The GOT Mobile function makes it possible to view information collected by GOTs on-site from information devices such as PCs and tablets in remote locations. The operation status, error status, etc. of multiple lines installed at a factory can be monitored remotely without being on site. Users can also use Pocket GOT, a mobile application for GOT, to receive notifications of user alarms that are occurring on monitored GOTs to mobile devices.



The status of the entire factory can be checked at a glance from a remote PC, reducing wasted time when an error occurs, and significantly reducing downtime.

Product and Solution Introduction

▶ GOT2000 Series (GOT Mobile Function)

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Case 12

Equipment level

Predictive Maintenance

Preventive Maintenance

Corrective Maintenance



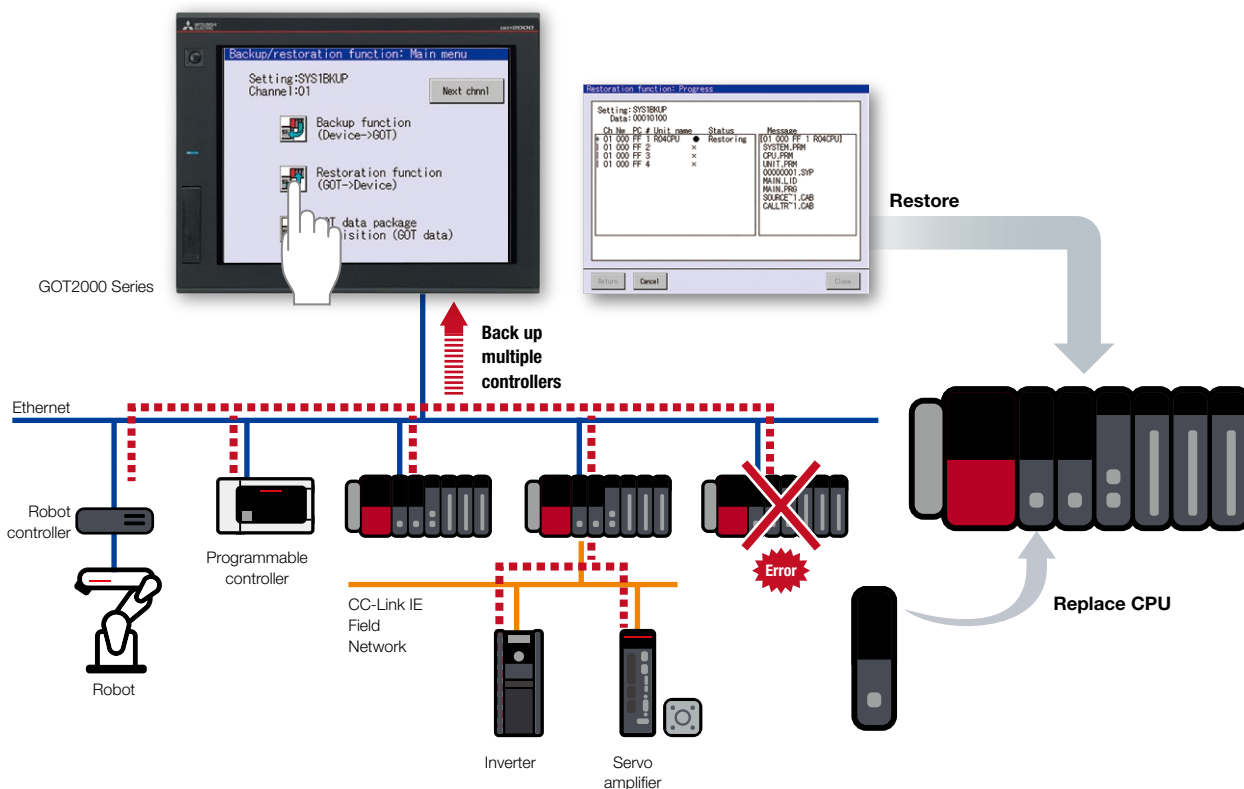
Restoring FA device programs on-site immediately

In the event of PLC failure or a dead battery, new equipment and a computer for writing programs must be prepared, which means recovery takes a long time.

Solution

Enable easy backup/restoration of FA device programs and parameters

The GOT Backup/Restoration function allows users to back up programs and parameters of FA devices such as PLCs to a GOT SD memory card or USB memory. Programs and parameters can be easily restored from GOT to FA devices when the devices need to be replaced.



By performing backups in advance, it is possible to restore FA devices from GOT on-site without a PC in the event of an FA device failure, which reduces downtime.

Product and Solution Introduction

► MELSEC iQ-R Series

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► MELSEC iQ-F Series

P.22

► GOT2000 Series

P.28

Case 13

Device level

Predictive
MaintenancePreventive
MaintenanceCorrective
Maintenance

Using robots reliably

Need to compare the current condition of a robot with when the robot was first introduced because errors that did not occur at first-time use have been occasionally occurring.

Solution

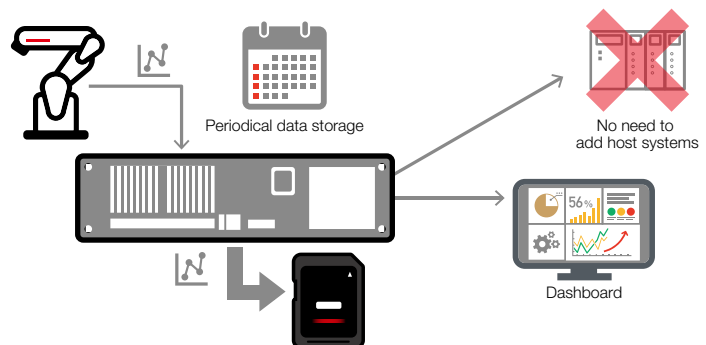
Automatically collect daily operational information and periodically save robot program

Daily operational information is automatically saved, enabling status check at the time of introduction. Backup data is automatically saved periodically, enabling restoration from the calendar.

1 Condition management function

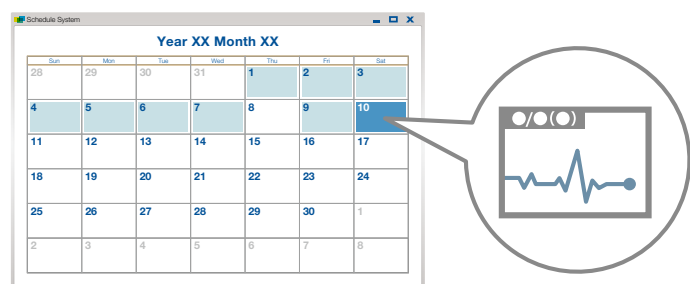
This function automatically saves and complies robot operation and maintenance data every day in the dedicated SD card of iQ Care MELFA Support, allowing users to refer to the operational information*¹ without complicated data processing. Saved data is filed as text data in the csv format which can be used for secondary processing in accordance with the customer's application. By linking with the predictive maintenance function, maintenance monitoring of robots are easily performed.

*¹ For data reference, RT ToolBox3 (Mitsubishi Electric's PC software supporting robots) is necessary.



2 Recovery function

The date on which backup data is saved can be easily searched from the calendar view, and the robot settings can be restored to the status of the specified date. Backup data is automatically saved, and thus users can operate the robot reliably without complicated saving operations.



Easily compare the condition of robots with and without errors by automatically aggregating the robot daily operational information and managing the history data. Restore robot programs anytime from automatically backed up data in the SD card. In case of sudden failures, these failures can be quickly resolved.

Product and Solution Introduction

► iQ Care MELFA Support

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Case 14

Device level

Predictive Maintenance

Preventive Maintenance

Corrective Maintenance



Resolving inverter issues smoothly

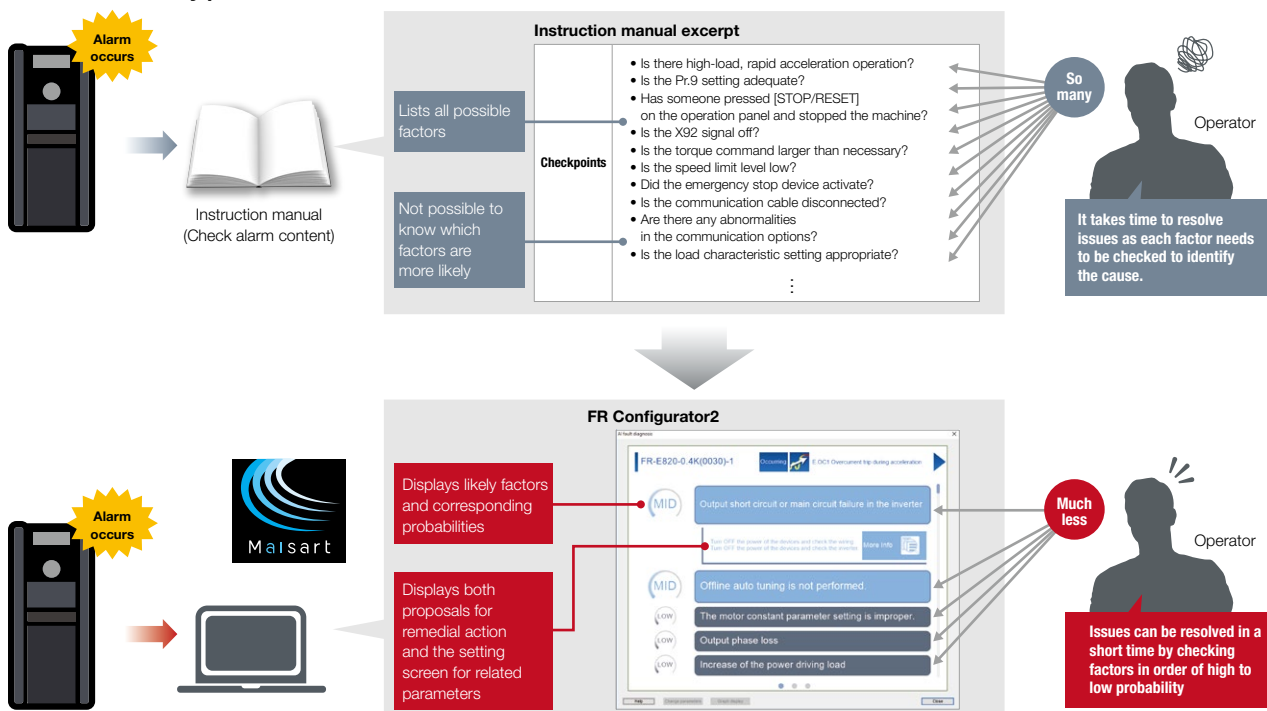
It takes time to resolve issues because checking the cause of inverter alarms one by one in the instruction manual is time consuming.

Solution

Support the use of AI inverter troubleshooting

Utilizing the AI alarm diagnostic function installed in the FR Configurator2 inverter setup software, alarm factors can be checked in order of most likely to least likely.

■ Current recovery process



Achieve easy and quick troubleshooting that reduces downtime.

Product and Solution Introduction

► FREQROL-E800 Series (FR Configurator2) P.38

MELSEC iQ-R Series

A manufacturing plant is seldom stopped or taken offline and continuously produces the desired product or component. However, the control system occasionally requires maintenance; for example, at the time of a faulty product or system upgrade for manufacturing a new or updated component. At that time, thanks to the extensive maintenance functions embedded in the hardware and software, the user can trust the control system to handle transition into/out of the maintenance period for both preventive and post maintenance.



MELSEC iQ-R series

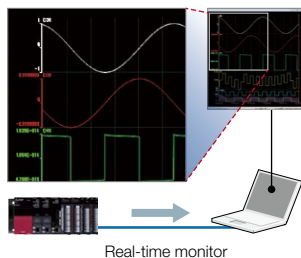


GX LogViewer

iQ-R **iQ-F**

Visualize manufacturing data in real-time

- Monitor live manufacturing process data across the plant
- Very easy setup using the dedicated GX LogViewer monitoring tool



CPU/ Output module

iQ-R **iQ-F**

Prevent system downtime with relay monitoring

- Monitors relay switching amount
- Check relay condition from GOT (HMI)
- Plan module maintenance prior to malfunction of relay



MELSEC iQ-F Series

Based on the concept of "Easy, Convenient, and Excellent Cost Performance," the MELSEC iQ-F Series contributes to customers' operations with functions that are enhanced by IoT and maintenance functions that are useful for early recovery in the event of trouble. From stand-alone use to system proposals including networks, we strongly support our customers' "one-step-ahead manufacturing."



MELSEC iQ-F series

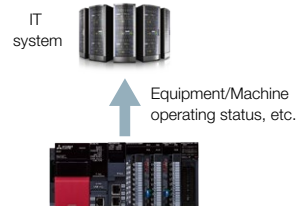


MES interface module

iQ-R

Direct access to enterprise level

- Registers device values directly into database
- Visible shop floor data enables actions before event occurs

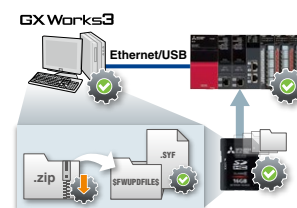


CPU/ Intelligent function module*

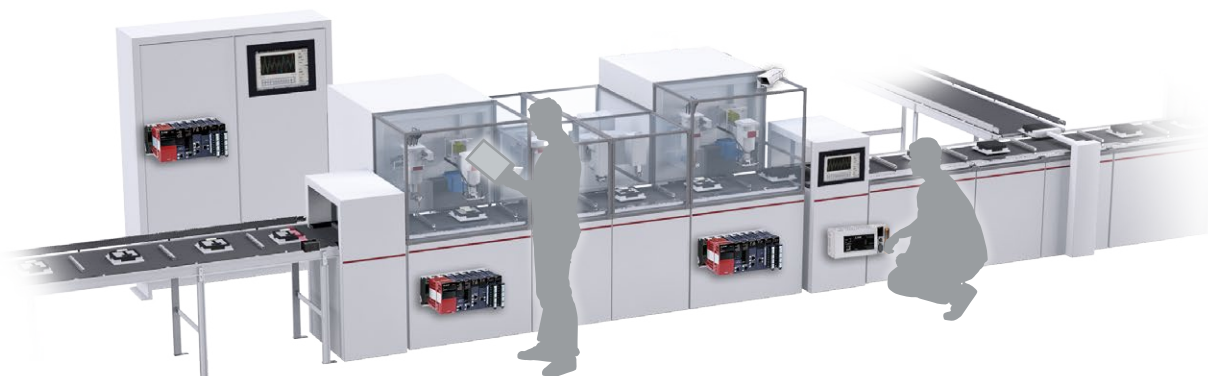
iQ-R **iQ-F**

Module firmware update ensuring latest functional version module

- Utilize new functions and features immediately
- Update multiple modules using GX Works 3 in one go
- Direct updating using a SD memory card



* Please refer to the manual regarding support for each model.



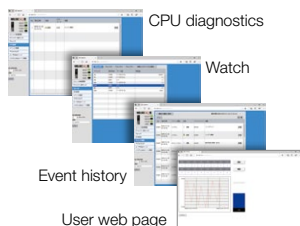


CPU module

iQ-R iQ-F

A web server function enabling users to easily check the status of their device via web browser

- Monitor various module status data:
 - CPU diagnostics
 - Device block monitor/watch
 - Event history
- Supports custom made web pages

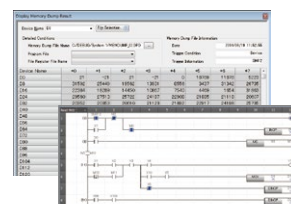


CPU module

iQ-R iQ-F

Memory dump enables confirmation of operation problems

- Saves block of device data when error occurs
- Root cause analysis by confirming data on device monitor screen and offline via program editing window



Memory dump results (Program editor)



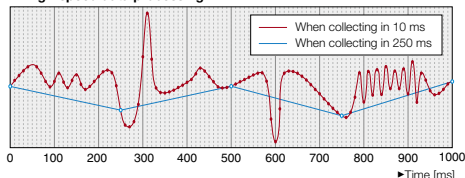
Energy Measuring Module

iQ-R

Early detection of equipment errors with energy measurement leading to Preventive Maintenance

- Using only one module, highly detailed information such as electric energy (consumption and regeneration), reactive energy, current, voltage, can be measured for individual production equipment.
- Improved productivity of both equipment and the production line can be achieved by synchronizing the monitoring of consumed energy and specific energy consumption management with the control program.

High-speed data processing

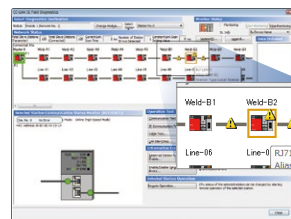


GX Works3

iQ-R iQ-F

Quickly find network errors

- Visualize error location from network system image
- Easy network error corrective measures



CC-Link IE Field diagnosis window

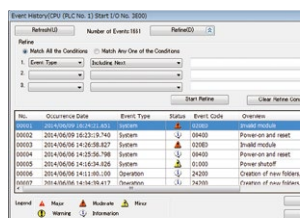


CPU module

iQ-R iQ-F

Efficient diagnostics with extensive event logging

- Logging of program change events, errors and when the power is turned off
- Event logging displayed in list form
- Quickly detect problems due to operating mistakes by multiple users



Event log list



GX Works3

iQ-R iQ-F

Switch between multiple languages for global support of maintenance

- Comment/label names can be registered in multiple languages
- Easy to switch between languages
- No need for multiple programs to satisfy regional requirements



Switch between device comment languages

System Recorder

The system recorder is a Corrective Maintenance solution that ensures effective resumption of operations reducing downtime through its extensive system-wide data recording and simplified analysis software features. Data before and after the set trigger can be collected with a timestamp every scan. This eliminates the need to worry about what data is being collected when setting up recording and supports swift recovery operations.



Corrective Maintenance solutions with System Recorder

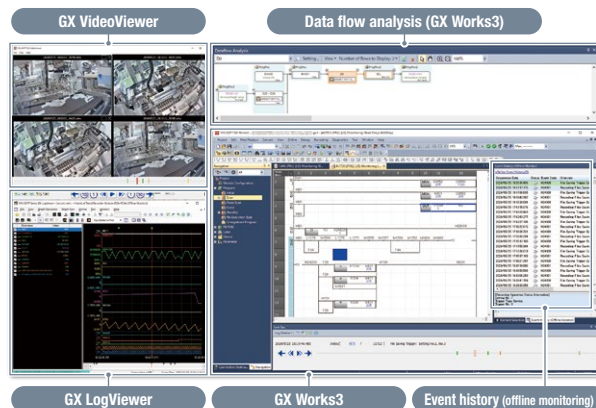
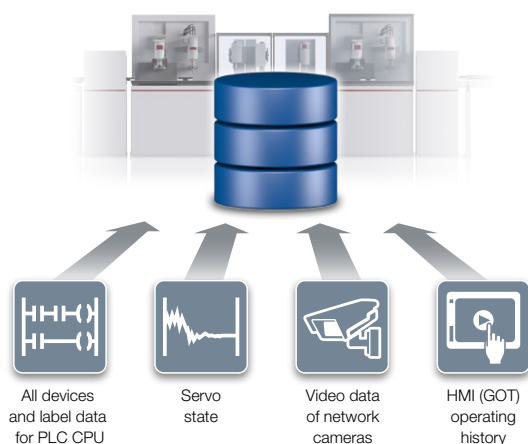
Significantly reduces machine downtime with "complete recording" and "easy analysis" of system operating status during error

Complete recording

- Complete recording of all data required for error analysis
- Complete system recording
- Complete prolonged recording

Easy analysis

- Display all data on the same timeline
- Expresses influencing factors in straightforward terms
- High-productivity programs also offer speedy solutions



Complete recording

When problems arise for equipment with multiple devices, it is necessary to find out the facts before and after such an occurrence (when, where, and what happened) in order to recover normal operation.

Mitsubishi Electric's system recorder can record the entire process condition and offer an operations log for control data of multiple equipment and devices, allowing the reproduction (or playback) of the process offline, helping to highlight and show the actual cause of failure.



Want to record video and data

Recording function (MELSEC iQ-R Series)

All device/label logging per sequence scan

Recorder module exhaustively records changes in all devices/labels

All labels/FB logging of the PLC

Unconsciously records all device addresses/system configurations

Event history

Records device/label operations from external devices

General-purpose network camera video

Records visual information such as work behavior and user's behavior

Also want to record drive system conditions

MELSERVO-J5 Series/MELSEC iQ-R Series Motion module

All device/label logging per sequence scan

Timestamped and accurate recording of motion control data that operates faster than a PLC scan

Also want to record users' operations

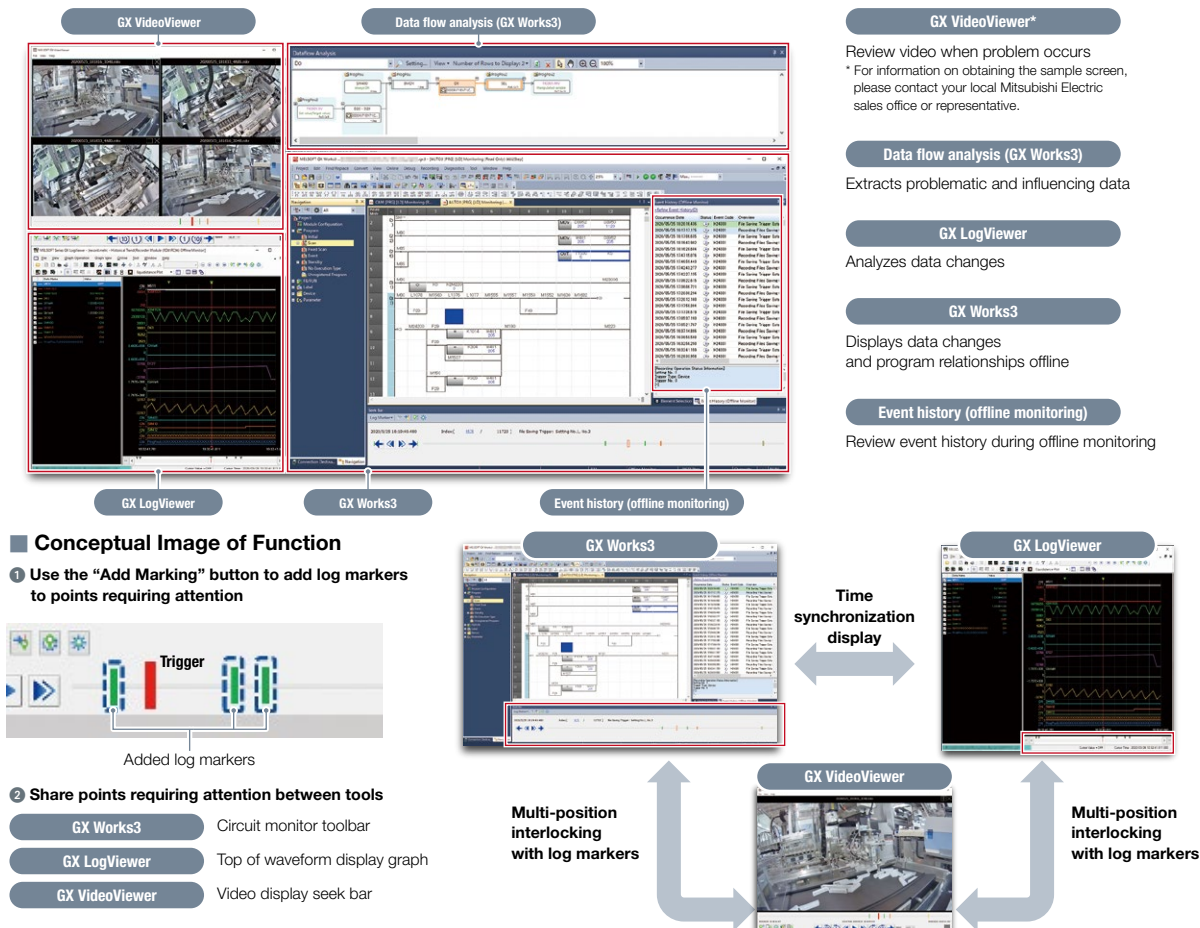
GOT2000 Series

Records HMI (GOT) operation history and alarm history

Records operation history of shop floor workers and alarm information for connected devices

Easy analysis

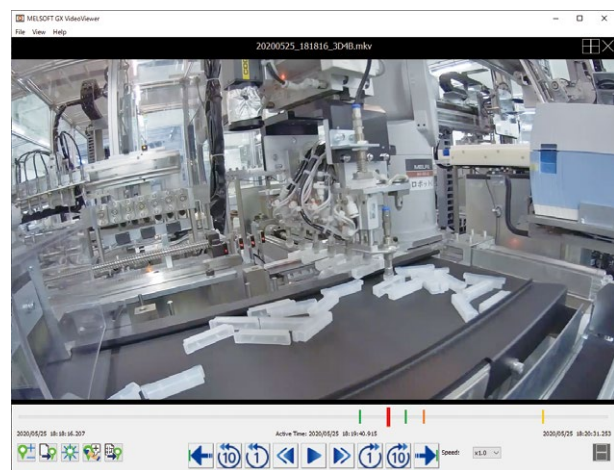
The data collected through complete recording (recording file) can be reproduced offline together with program operation transition. Moreover, by confirming data together with camera video footage, this function enables marking of potentially problematic points (time of error occurrence) from the video. The reviewer can share the equipment conditions at the marked time with shop floor workers, maintenance personnel and designers, thus smoothly communicating to ensure everyone has the same understanding of the error occurrence status from vast amounts of video data and, ultimately, easily identifying the cause of the error.



System recorder related software

GX VideoViewer

Playback of recorded video up to four screens, while freely playing forward one frame, fast-forwarding, and rewinding. Each video can be linked to check in the same timeline. Color-coded log markers can be added to the video timeline, which is useful for analyzing among multiple personnel and inspection. Log markers are synchronized with related engineering software.



GX VideoViewer Pro



AI technology that extracts differences from the target video by comparing "appearance" and "operation" without deep learning

In addition to the functions of GX VideoViewer, this software identifies and marks differences (abnormalities) in videos with simple settings.

*1 Based on Mitsubishi Electric research as of April 28, 2022

① Automatically mark differences in the recorded video feed

- Extracts differences in the video feed that differ from normal patterns and adds a mark in the video feed and on the seek bar
- AI analyzes differences of appearance and operation with unique algorithm, enabling easier error analysis
- Significantly reduce the time to find errors and such occurring at a high-speed which cannot follow with the human eye

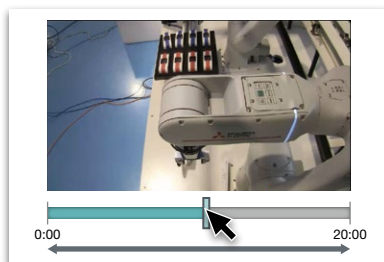
② Easy 2-step setting

Automatic extraction by unique algorithms can be set up in 2 simple steps:

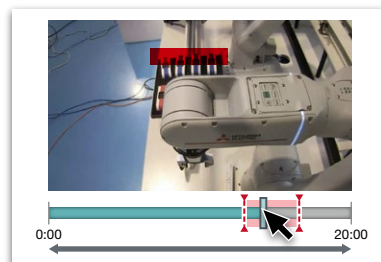
- Step ①** Set camera images of normal operation. (generation of normal pattern)
- Step ②** Execute difference extraction.

Differences are extracted according to changes in "appearance" and "operation", then marked on the video feed automatically. The log markers can be synchronized with other software.

Conventionally Differences from normal patterns are checked by an operator



Possible differences from normal patterns are automatically extracted



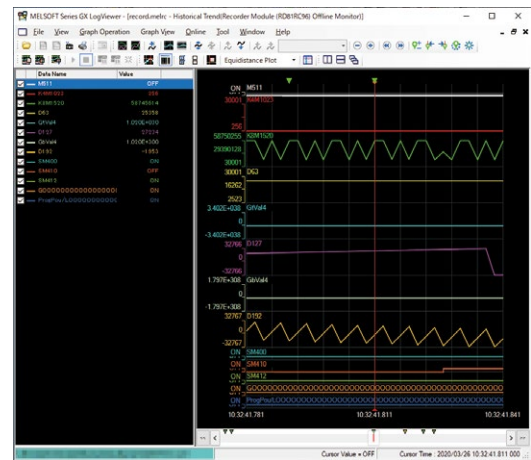
■ : Different area in the video
 ■■■ : Different area duration displayed on the seek bar

User benefits

Differences are automatically extracted from the recorded video feed, saving labor time in identifying the cause of abnormalities

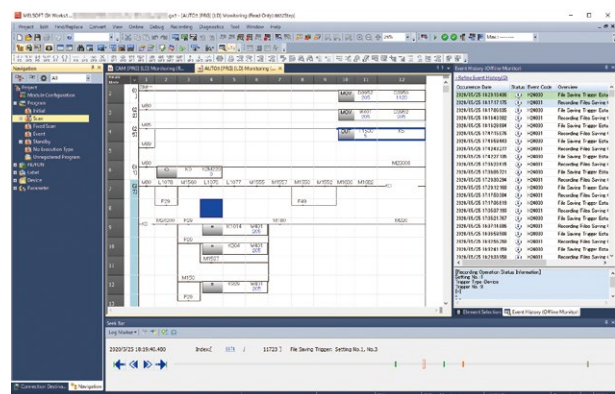
GX LogViewer*

GX LogViewer allows observation of device values, which represent quantities that change over time, by zooming in and out of waveforms similar to an oscilloscope. Difference can be checked by superimposing multiple waveforms and observed from repeated patterns and such.



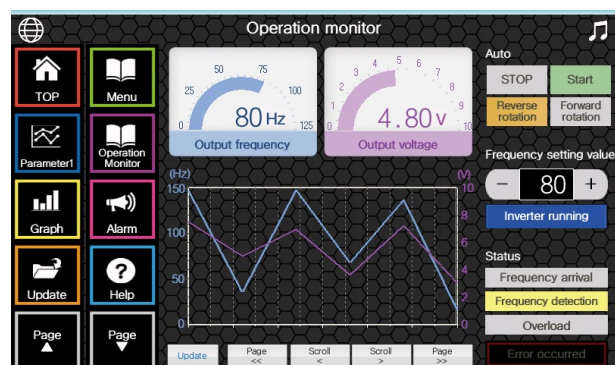
GX Works3

GX Works3 is must-have software for designers and maintenance personnel. Program steps can be followed and device value changes can be checked offline by synchronizing the recorded system recorder data with log markers. Data flow analysis visualizes device values and programs affecting the data value change, helping to identify the cause of faults. This can reduce analysis time. Supported programs which synchronize with log markers include not only ladder programs but also function blocks that are easy to follow from the program.



GT Designer3

Screen creation software for GOT (HMI).
GOT (HMI) display/operation log/alarm history can be displayed offline by synchronizing with other applications, making it easier to visualize an error.



GOT2000 Series

A full lineup that conveys the monozukuri philosophy to the world and responds to the needs of production shop floors. In addition to interaction with FA devices, the GOT2000 Series pursues good operability, and contributes to higher productivity and efficiency.

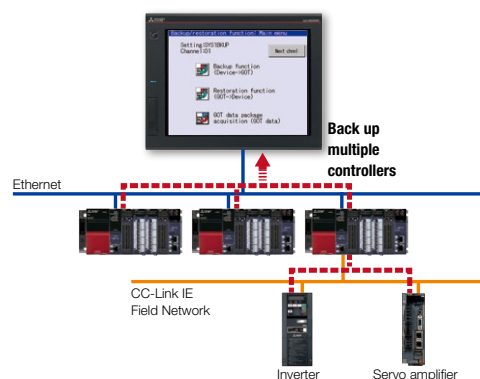


Backup/Restoration GT27 GT25 GT23 GT21 GS21

Data such as programs and parameters of programmable controller CPUs, etc. can be stored (backed up) and written (restored) on GOT SD memory cards and USB memory devices.

By backing up data to a GOT in advance, it is possible to replace and recover using the GOT alone without the need for a PC when replacing programmable controller CPUs or other FA devices.

- * Excludes GT2103-PMBS.
- * Requires a separate SD memory card or USB memory device.
- * Depending on the GOT model, restrictions apply to some functions or connectable equipment.



Drive Control Interaction GT27 GT25 GT23 GT21 GS21

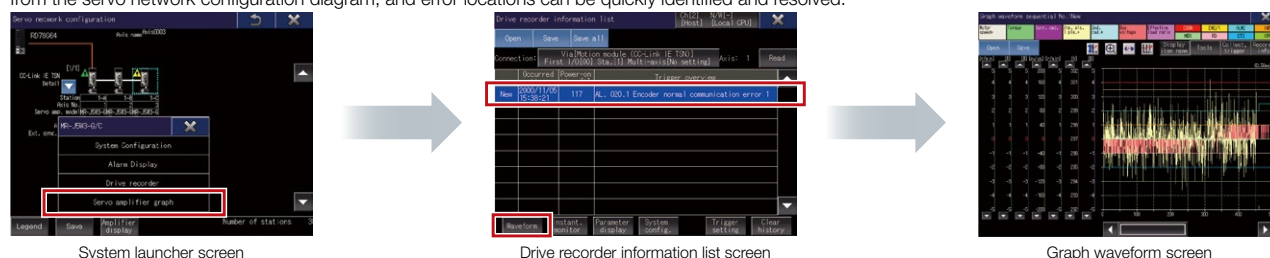


GOT can be used to achieve efficient start up, adjustment, and maintenance of drive control equipment. GOT screens (dedicated functions and sample screens) for each interactive functions are available.

- * Depending on the GOT model, restrictions apply to some functions or connectable equipment.

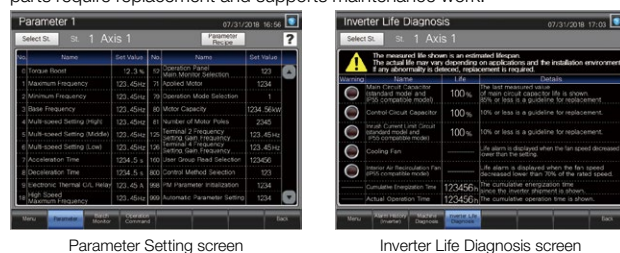
Servo amplifiers

Users can check the status of servo amplifiers connected to GOT from the servo network configuration diagram. In addition, the drive recorder can be started from the servo network configuration diagram, and error locations can be quickly identified and resolved.



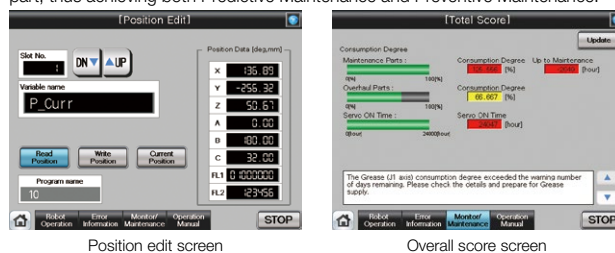
Inverters

The GOT enables efficient parameter setting work for multiple inverters. In addition, inverter service life diagnosis checks whether or not consumable parts require replacement and supports maintenance work.



Robots

Utilizing GOTs, it is easy to start and stop robots, monitor error information, etc. In addition, GOTs can check the degree of wear and signs of failure for each robot part, thus achieving both Predictive Maintenance and Preventive Maintenance.



GOT Mobile Function GT27 GT25 GT23 GT21 GS21



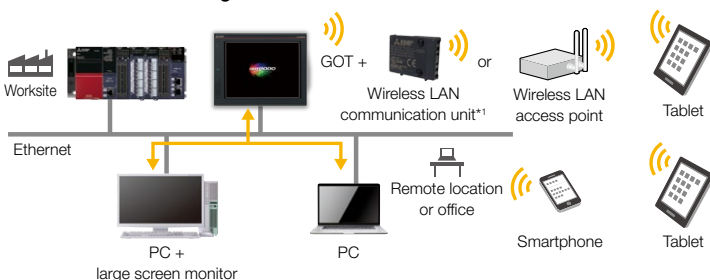
The GOT Mobile function allows users to check equipment status from a remote location via a web browser on an information device (PC, tablet, smartphone, etc.) through the GOT operating on a shop floor.

Five information devices (clients) can access such information device simultaneously, each displaying and operating a different screen.

* A separate license (GT25-WEBSKEY-□) is required.

* Up to five clients can be connected to a single GOT simultaneously.

Simultaneous monitoring from five information devices

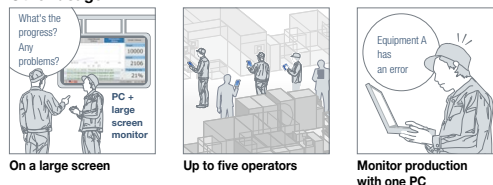


*1 The wireless LAN communication unit cannot be used with GT2505 and GT25 handy.
An access point is required separately.

Check the status of the worksite using a web browser.

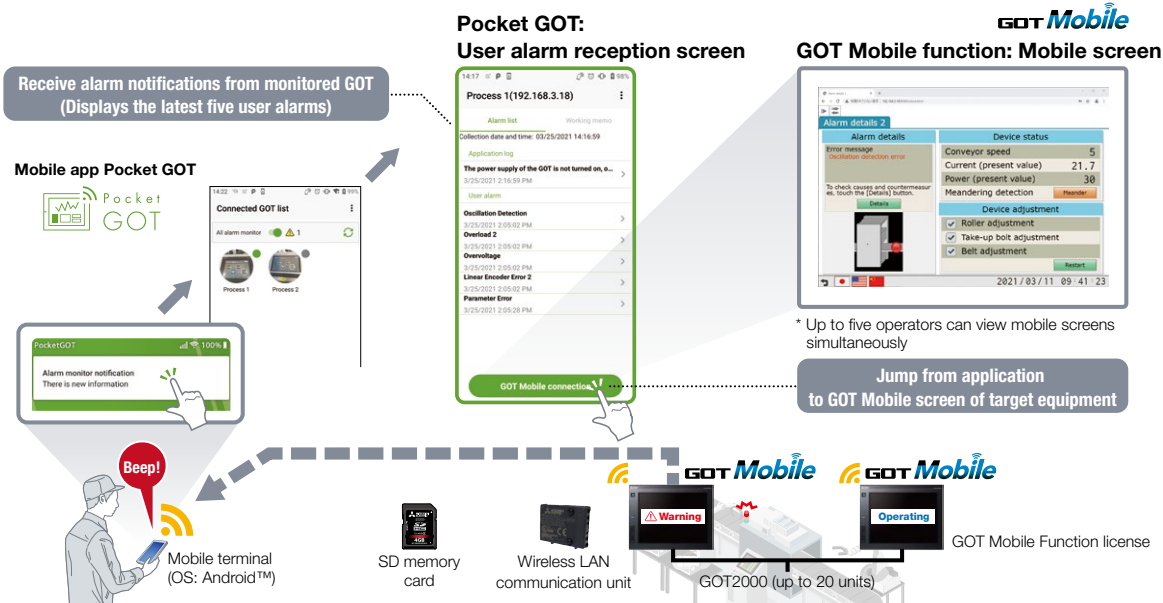


Other usage



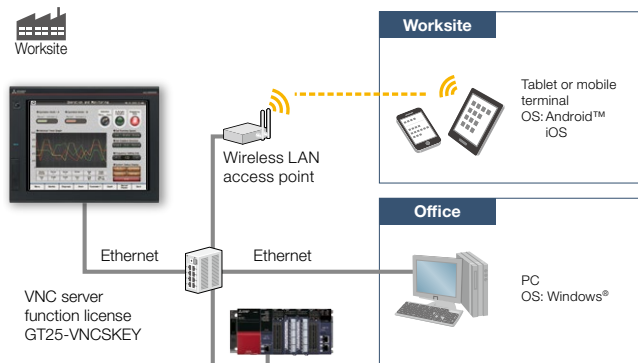
In addition, by installing the mobile app Pocket GOT on a mobile terminal, the app collects the status of user alarms occurring in the monitored GOT and notifies the users with vibration, sound, or banner when a new alarm is detected.

GOT Mobile can be opened from Pocket GOT and the status of the GOT with the user alarm occurring can be checked on the user's mobile terminal.

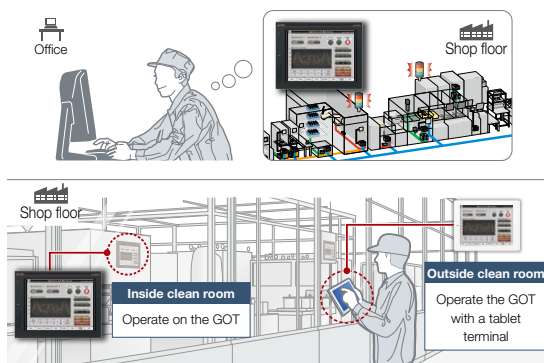


VNC Server Function GT27 GT25 GT23 GT21*2 GS21

Users can view and operate GOT screens from a remote location using an information device such as a PC or tablet. There is no need to create dedicated screens.



*2 Supported by GT2107-W only.



e-F@ctory Starter Package

The e-F@ctory Starter Package consists of sample projects for the PLC MELSEC iQ-R/iQ-F Series and HMI GOT2000 Series. By providing programs for visualization, easy analysis, etc., in sample project form, this product single-handedly integrates IoT on the production shop floor with basic settings such as device allocation and parameter settings.

The e-F@ctory Starter Package helps to provide solutions to various issues that may occur when introducing IoT systems such as investigation period and budget.



eFactory Starter Package



GX Works3 sample project for the MELSEC iQ-R/iQ-F Series



**GT Works3 sample project
for the GOT2000 Series**

**Instruction manual**

Visualization of overall equipment efficiency **iQ-R** **iQ-F**

A general display of equipment production/operating status, including overall equipment efficiency and production volume.

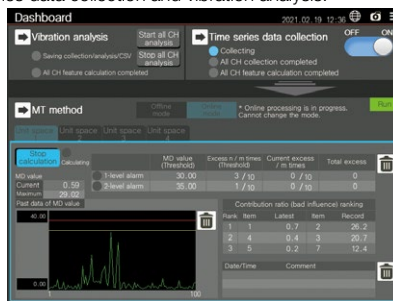


* The sample screen shown above is from the MELSEC iQ-R Series.

Detection of irregularities using the MT method **iQ-R** **iQ-F**

Expresses degree of divergence between regular data and input data in numerical form and detects errors.

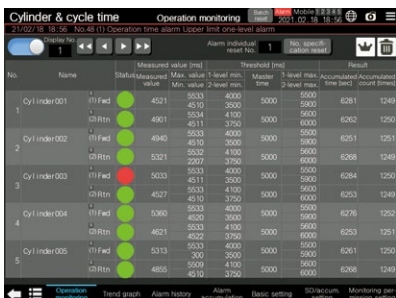
The iQ-R Series also includes a function to input feature quantity derived from time series data collection and vibration analysis.



* The sample screen shown above is from the MELSEC iQ-R Series.

Error detection by monitoring cylinder operation time **iQ-R** **iQ-F**

Measures and monitors cylinder conditions, operations, and equipment operating cycles to identify any sign of errors.



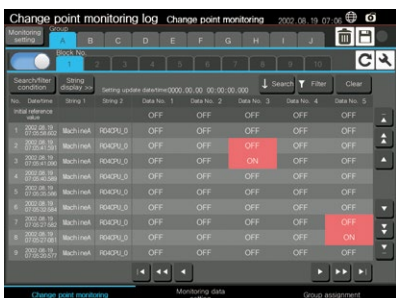
* The sample screen shown above is from the MELSEC iQ-R Series.

Error detection by monitoring analog waveform status iQ-R iQ-F

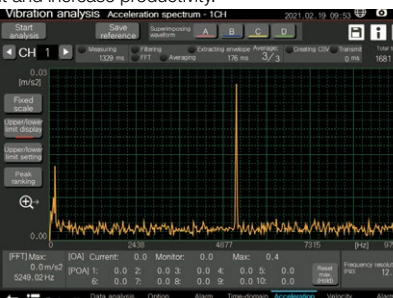
Uses thresholds to monitor the shape of the waveform. Guard band monitoring makes it possible to monitor the waveform status of analog waveform data such as electrical current and temperature. Accordingly, it is possible to detect abnormal waveform fluctuation that was difficult to detect with threshold monitoring based on simple upper/lower limits.

Management of equipment/process changes **iQ-R**

Users can manage change points according to the 4M and 5M+1E perspectives used in quality management, and then use this information for cause analysis when a problem arises.

Error detection by frequency analysis of vibration waveform **iQ-R**

Uses vibration analysis (FFT) to express vibration created by equipment, devices, and products in numerical form and visualize the status. Detection of abnormal vibration makes it possible to perform Predictive Maintenance on equipment and increase productivity.



3D Simulator MELSOFT Gemini

MELSOFT Gemini is a 3D simulator that lets you pre-verify line devices and equipment in digital space, streamline each manufacturing process, and troubleshoot errors. Line and equipment simulation allows pre-verification of line productivity and equipment operation, supporting fast and simplified launch of actual equipment and lines.

Line simulation

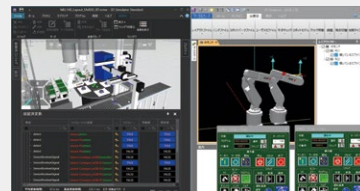


Simulate flow lines of people, robots and AGVs, and line operating rate

Equipment simulation



Check interference in 3D space before launch



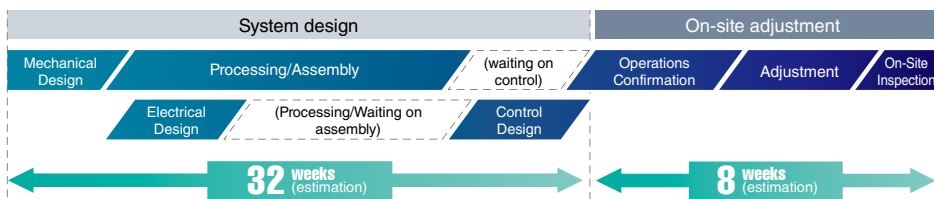
Confirm control logic by connecting 3D simulator to various controllers

Benefits of 3D simulator MELSOFT Gemini

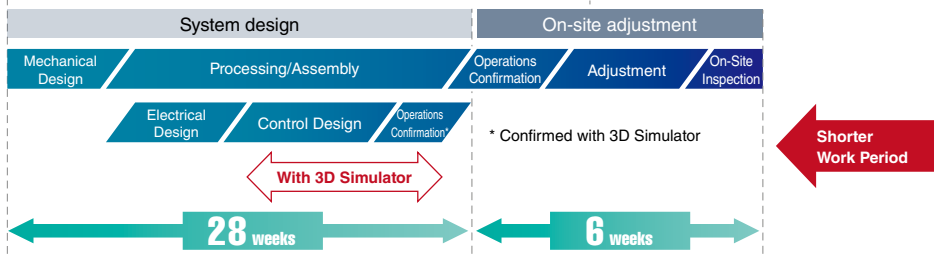
During the line design/verification phase, the 3D simulator allows engineers to design equipment layouts and components optimal for production, increasing productivity, improving quality, and reducing cost.

During mechanical/electrical/control design phases, the 3D simulator allows front loading of operations confirmation and adjustment, shortening the work period from equipment design to on-site adjustment.

Conventional Design Phase and Work Duration



Design Phase and Work Duration with 3D Simulator

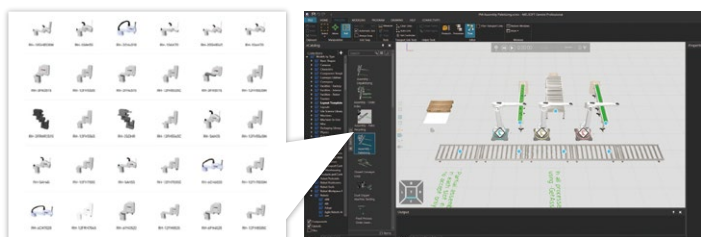


Cost effectiveness example

Initial cost	Construction period	Introduction effectiveness	Payback period
<ul style="list-style-type: none"> Gemini software cost Training cost Labor cost to develop a system using Gemini 	<p>Approx. 6 weeks shorter</p> <p>* When SI costs 80 thousand yen per day, cost reduces by 2.4 million yen (5 days × 6 weeks).</p>	<p>6-week production profit due to shorter startup time</p> <p>* When production profit per day is 2.7 million yen, profit increases by 81 million yen (5 days × 6 weeks).</p>	<p>Approx. 5 days</p> <p>* Calculation example for the following case: Initial cost = 15 million Cost reduction due to shorter construction period = 2.4 million Introduction effectiveness = 2.7 million</p>

Simple equipment layout with an abundant e-catalog

Contains all the parts necessary for line layout verification, including robots, conveyors, and machine tools (approx. 2800 parts). Mitsubishi Electric robots are also included in the lineup, with emphasis on the MELFA RH and RV Series. Layout is possible by dragging & dropping parts and performing simply settings.



Pre-verification of machine operation & control program

Link Gemini 3D simulator with MELSOFT simulators to confirm control logic in 3D space without actual machines.



3D Simulator MELSOFT Gemini

MELSOFT iQ Works

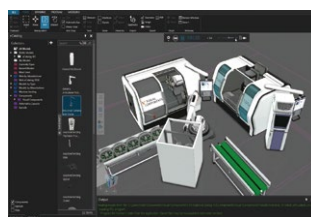
(Program debug)
MELSOFT simulators (control design)

- PLC Simulator
- Motion Controller Simulator
- Robot Simulator
- HMI Simulator

Direct connection to Mitsubishi Electric simulators and equipment

OPC servers are unnecessary*1 because the 3D simulator directly connects to various simulators and factory automation equipment manufactured by Mitsubishi Electric, which increases the accuracy of mechanical interference checks compared to an OPC connection. The elimination of the OPC servers reduces labor hours to set up.

*1 Connect other vendors' equipment through OPC servers.



3D Simulator MELSOFT Gemini

High interference check accuracy due to direct connections

Direct connection (high-speed communication)

OPC Server

Connection with other vendors' equipment via OPC Server.

Mitsubishi Electric FA equipment



Other vendors' equipment and simulators

Error reproduction with system recorder display

Operations can be compared in 3D with the 3D simulator in addition to ladder monitor display, waveform display, and video data display of log data. Examination of detailed operation status before and after an error leads to quick troubleshooting.

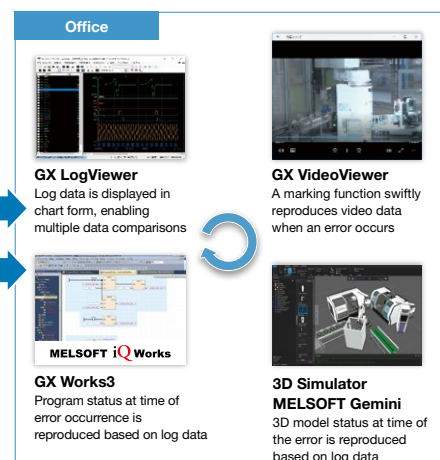


CSV

Log data

Video data

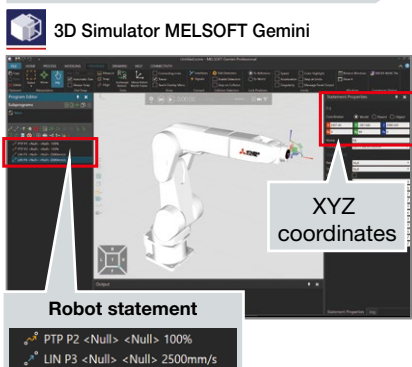
MP4



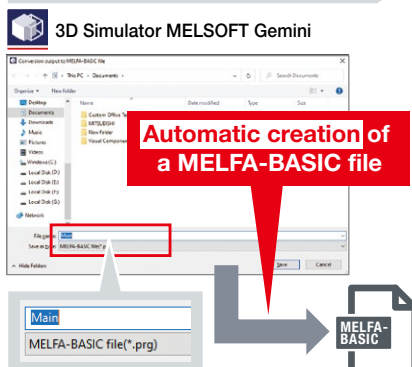
MELFA-BASIC program conversion output function

This function automatically generates a MELFA-BASIC program based on a robot statement of a Mitsubishi Electric robot for which teaching has been conducted in MELSOFT Gemini. This reduces time required to prepare control programs.

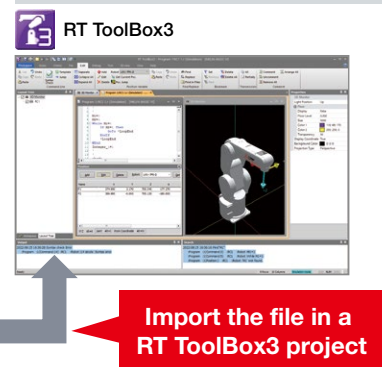
1 Offline teaching using UI operation



2 Export a program in MELFA-BASIC format



3 Use the file in RT ToolBox3



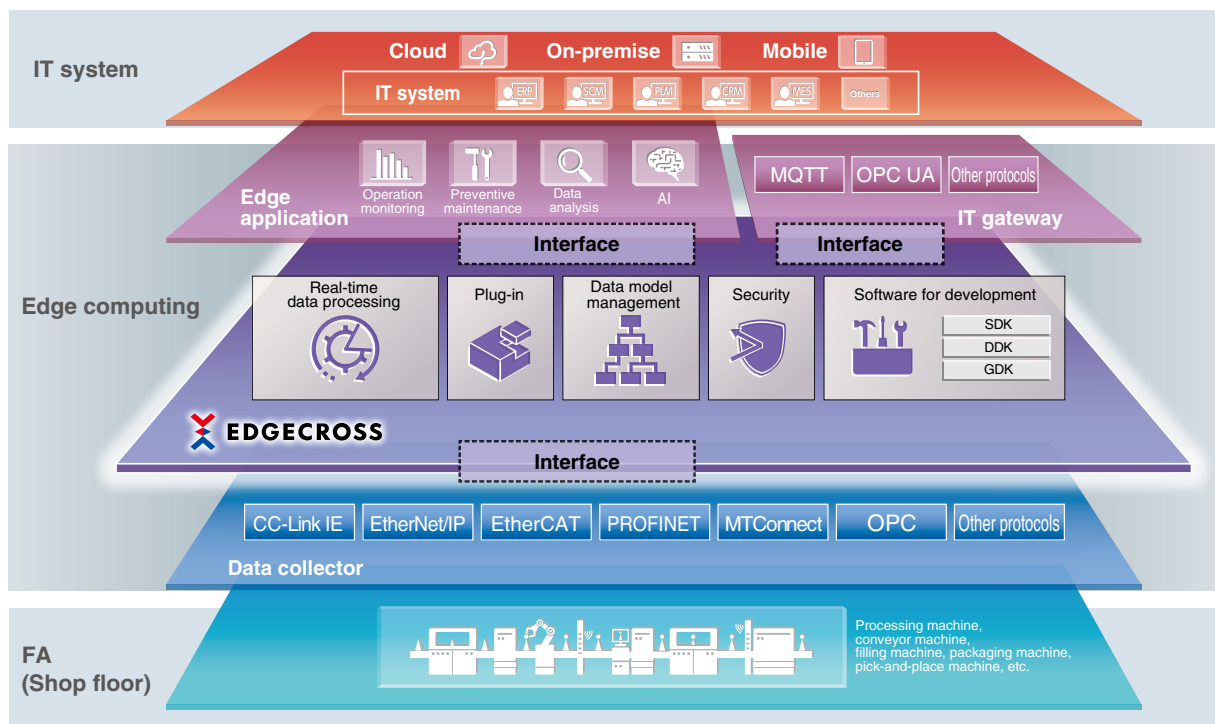
Open Platform Edgecross



In the manufacturing industry, IoT adaptation is accelerated to enhance competitiveness and create new value. Following the trend, Edgecross Consortium aims to create new added value based on the edge computing layer beyond the borders of companies and industries, contributing to IoT adoption in the manufacturing industry.



Creating new value with a focus on the edge computing domain



Contact us

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● Edgecross Consortium
<https://www.edgecross.org/en/>



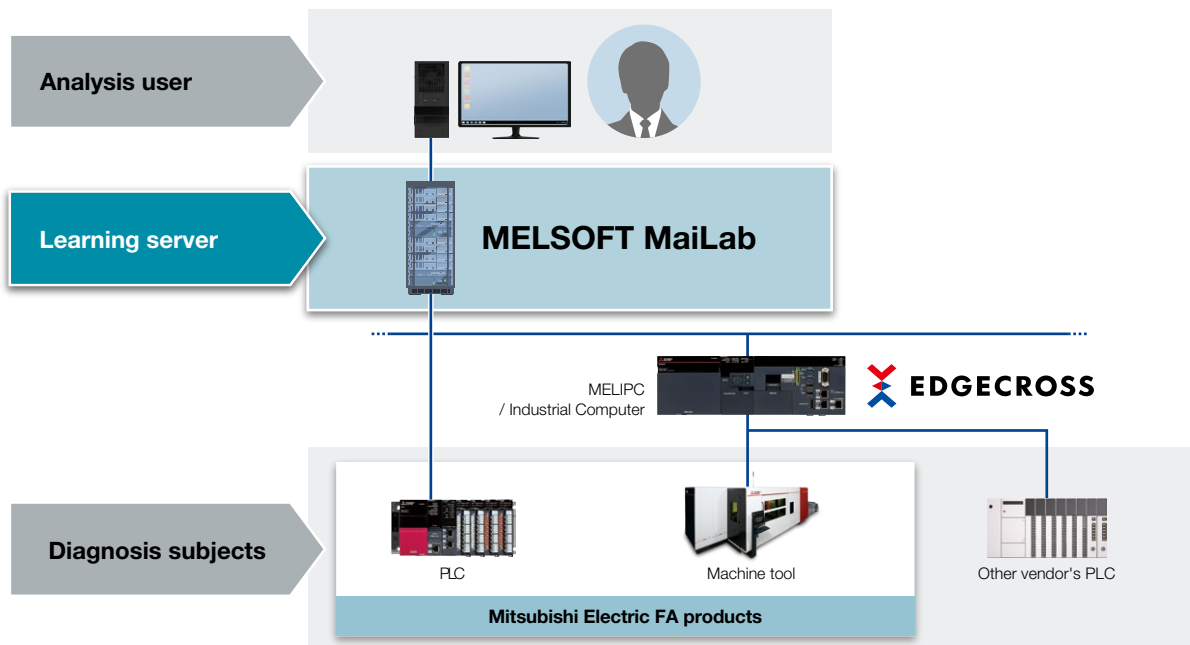
Data Science Tool MELSOFT MaiLab

Mitsubishi Electric's Data Science Tool MELSOFT MaiLab is a data science tool that further improves manufacturing by replacing "human experience and intuition" with digital technology and enabling it to be easily incorporated into control systems. It utilizes AI technology such as deep learning and offers a variety of analysis methods, enabling automation of processes that used to rely on the experience of skilled workers, saving workforce, and improving quality and productivity.



Connectivity with a variety of manufacturing equipment and other vendors' PLCs in addition to Mitsubishi Electric PLCs

Connect MaiLab with Mitsubishi Electric PLCs directly, or connect it with other vendors' PLCs and manufacturing equipment using Edgecross.

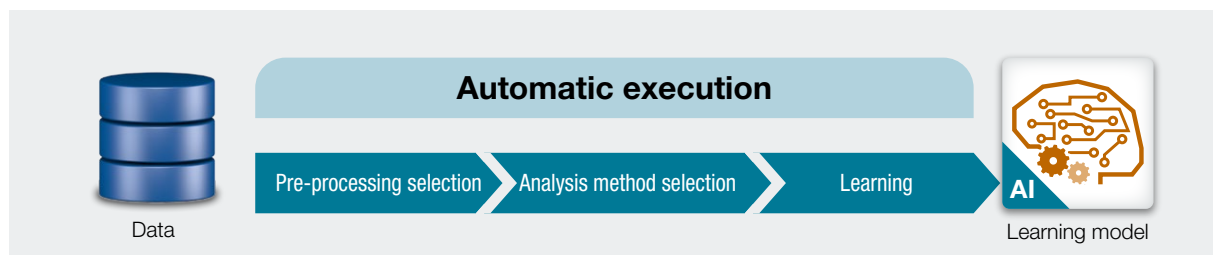


Shop floor data analysis/diagnosis without any specialized knowledge

The AI automatic learning function "AutoML" in MaiLab allows workers without specialized knowledge to analyze and diagnose the data from a shop floor to improve productivity. Workers with knowledge of AI can also use Python® code to customize AI as required.

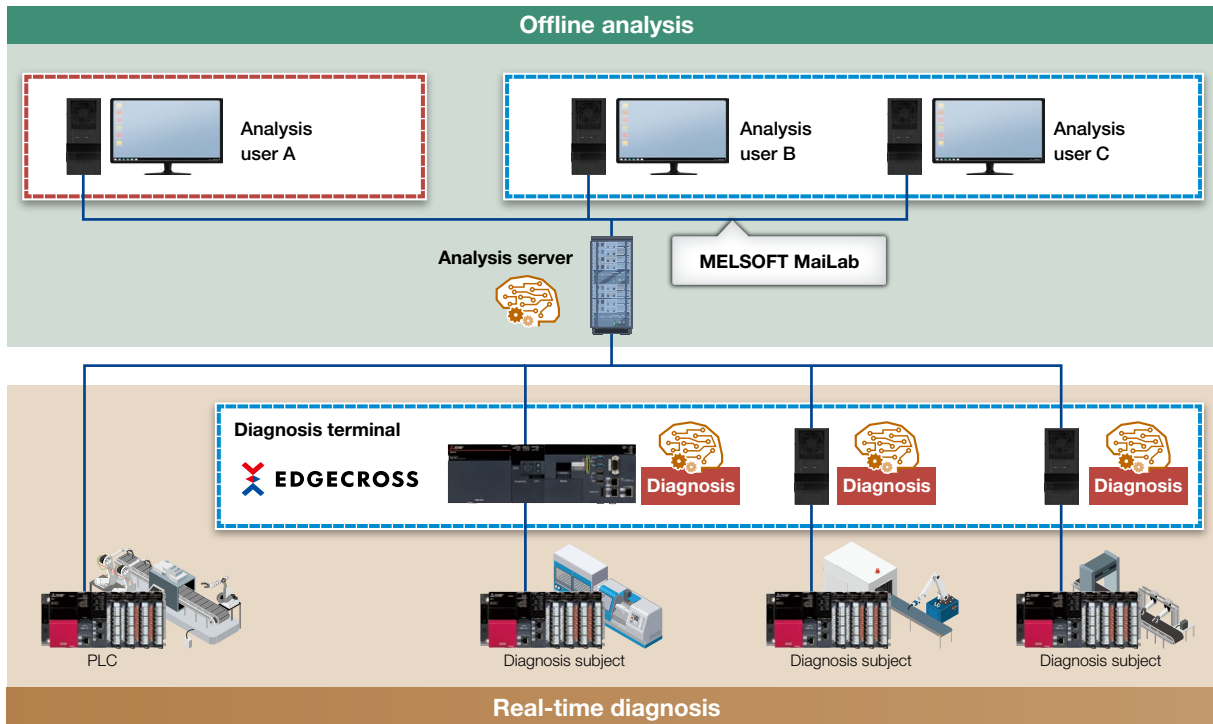
Let AI manage data analysis

The AutoML function automatically conducts everything from the pre-processing of data to learning models



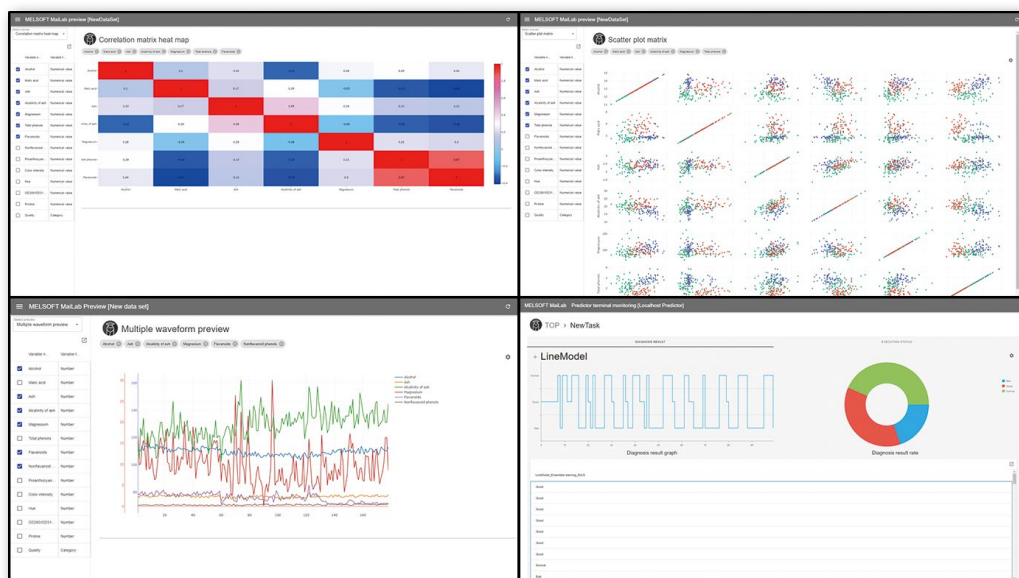
Flexible system configurations allow data analysis/diagnosis in ideal configurations

In addition to a basic license, licenses for analysis and licenses for diagnosis are also available. These additional licenses can be purchased as required according to the needs of each customer.



Graphical viewing for intuitive operation

An intuitive operation makes data analysis/diagnosis easy. Data from a shop floor can be displayed in a variety of graphs with sophisticated user-interface design, which enables users to analyze data from various points of views.



Industrial Computer MELIPC Series

Mitsubishi Electric's industrial-use PC MELIPC Series makes it possible to build systems with edge computing utilizing IoT at a high degree of freedom due to its robust features specifically for FA use and adoption of general-purpose applications. The lineup consists of four product types to suit various data utilization scenarios depending on the application; from a high-end model supporting a high-performance processor and CC-Link IE field network capable of high-speed communication to a simple and compact low-range model.



MELIPC

Pre-installed with Edgecross – an open software platform suited to data utilization



Edgecross^{*1}, a software platform in the edge computing domain, is preinstalled, therefore through combination with Edgecross-compatible software, it supports preventive maintenance and building of systems for quality improvement, etc. by utilizing shop floor data.

^{*1} An open software platform provided by the Edgecross Consortium, a general incorporated association.
<https://www.edgecross.org/en/solution/feature.html>

MI5000

Windows®

VxWorks®

One module realizing production data processing and real-time control

By running Windows® and VxWorks® real-time OS at the same time, one module can realize both device control and information processing, reducing system configuration cost and space. Control data and production data of devices can be communicated at 1 ms via CC-Link IE Field Network, realizing highly accurate device control and high-speed production data collection.



Intel® Core™ i7

MI3000

Windows®

VxWorks®

All-in-One panel computer with high-resolution touch panel equipped as standard

Large-screen and high-resolution LCD panel is equipped as standard for data display and touch operation. Light-touch operation is realized with a PCAP touch panel that is widely used for smartphones and tablet devices. The touch panel with high transmittance offers clear and high visibility display. In addition, pre-installed software GT SoftGOT2000^{*2} enables the same monitoring functions as the GOT2000 Series.

^{*2} GT SoftGOT2000 license key (for USB port) (sold separately) is not required.



GT SoftGOT2000

21.5" widescreen
Full HD

MI2000

Windows®

Achieving optimum IoT for the production shop floor with flexible system expansion

Intel® Core™ i3 is adopted as the CPU, and performs not only data collection, but also simple analysis, diagnosis, and monitoring of collected data to contribute to quality improvement. It also features a 2.5" HDD/SSD slot^{*3} and a PCI Express®/PCI slot^{*4} to accumulate large amounts of data and expand functionality.

^{*3} Only MI2000 has 2.5-inch HDD/SSD slot.

^{*4} MI3000 has PCI Express® only.



MELSERVO-J5 Series

The MELSERVO-J5 Series servo system significantly improves the industry-leading level of basic equipment performance. Its high-speed, high-precision capabilities help to increase the productivity of our customers' equipment.

In addition to enabling maintenance-free operation, MELSERVO-J5 servo amplifiers significantly reduce equipment downtime through early detection and fault diagnosis. Leveraging know-how and drive technologies accumulated over many years, this solution achieves Predictive Maintenance and supports planned maintenance work.



Mitsubishi Electric Maisart proprietary AI technology monitors machinery status and the servo amplifier detects signs of mechanical failure.

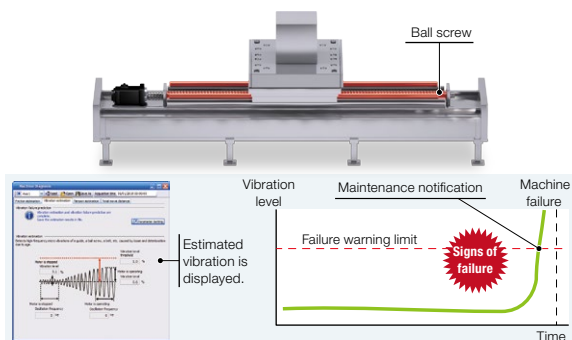
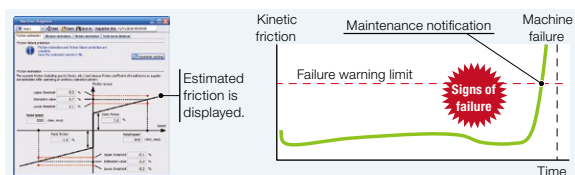
MITSUBISHI ELECTRIC SERVO SYSTEM
MELSERVO-J5



Machine Diagnosis (Ball Screws/Linear Guides)

This function supports Predictive Maintenance by estimating frictions and vibrations of mechanical drive components such as ball screws and linear guides.

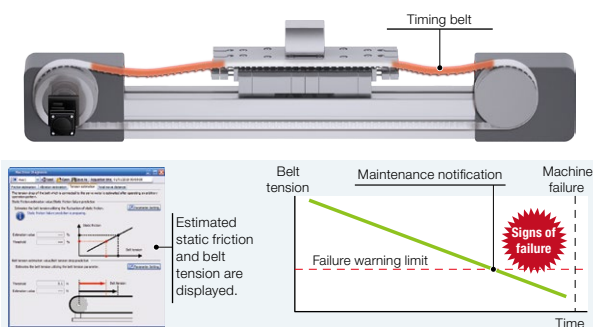
- Friction failure prediction with the friction estimation function
- Vibration failure prediction with the vibration estimation function



Machine Diagnosis (Belts)

This function detects aging deterioration of belts in advance by the static friction failure prediction and the tension deterioration prediction with the belt tension estimation.

- Static friction failure prediction
- Belt tension deterioration prediction

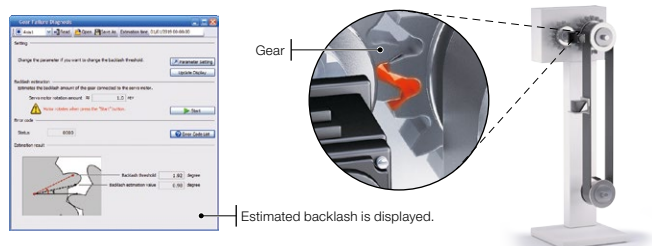


Machine Diagnosis (Gears)*

With this function, the servo amplifier generates commands automatically, and executes to-and-fro positioning operation to estimate the amount of gear backlash. Gear failure is predicted based on the set nominal values for backlash.

- Backlash estimation function
- Gear failure prediction

* The machine diagnosis (gears) does not work during normal operation.



FREQROL-E800 Series

In addition to support for multi-networks such as industrial open network CC-Link IE TSN, these products are equipped with the world's first*1 "corrosive gas detection circuit."*2

In addition, by adopting the latest technologies such as industry-first*1 AI technology, these products contribute to increasing operational intelligence in various areas such as factories and social infrastructure equipment.

The lineup includes FR-E800 (standard specification product), FRE800-E (Ethernet specification product), and FR-E800-SCE (safety communication specification product), offering a flexible selection to best suit customers' specific applications.

*1 According to in-house research as of September 10, 2019.

*2 Supported by FR-E800-E/FR-E800-SCE Series.



Mitsubishi Electric Maisart proprietary AI technology reduces downtime by rapidly identifying alarms.



Contributing to smarter factories and social infrastructure facilities through multi-network support

Mitsubishi Electric offers a lineup of inverter models to support major industrial Ethernet networks used in countries around the world. FR-E800 inverters support a variety of open networks without using any options, enabling the use of inverters on existing networks and assuring compatibility with various systems.

Supported protocols

Model	CC-Link IE TSN (100Mbps)*3	CC-Link IE Field Network Basic	MODBUS®/TCP	PROFINET	EtherNet/IP	BACnet/IP	EtherCAT
FR-E800-[EPA]	●	●	●	—	●	●	—
FR-E800-[EPB]	●	●	●	●	—	—	—
FR-E800-[EPC]	—	—	—	—	—	—	○

●: Supported ○: To be supported soon

*3 1 Gbps is optional (to be supported).

Contributing to reduced equipment downtime by equipping Predictive Maintenance and analysis functions

[Environmental impact diagnosis function]

The world's first*4 "Corrosive-Attack-Level Alert System (CALASTM)"*5 makes it possible to identify signs of inverter damage caused by corrosive gases such as hydrogen sulfide.*6 This function notifies operators when factors such as the production environment needs to be improved, resulting in reduction in the equipment downtime (for coated models (-60) only).

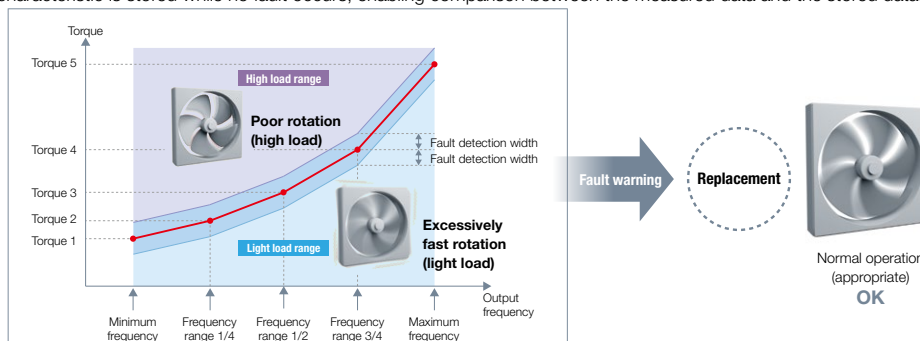
*4 According to our investigation as of September 10, 2019.

*5 The combined resistance of multiple metal corrosion sensors is measured to detect the degree of metal part corrosion caused by corrosive gas in the air (gradually adjust the progress of metal part corrosion caused by corrosive gas in the atmosphere by changing the material and thickness of the thin metal film used). [Patent pending]

*6 Others will be supported in the future.

[Load characteristics fault detection function]

When a mechanical fault such as clogging of the filter occurs, the inverter outputs a warning or shuts off the output to prevent system damage. The speed-torque characteristic is stored while no fault occurs, enabling comparison between the measured data and the stored data.



FR Configurator2 (Inverter setup software)

Software for easy configuration on a personal computer, covering everything from inverter start-up to maintenance. In addition to AI alarm diagnosis, it is possible to display graphs of inverter data, read/write limiter setting value, and more.

A trial version (available for a limited time only) can be downloaded from the Mitsubishi Electric FA site. Users can experience the same features as the full version for 20 days after installation.

[CNC] Remote Service iQ Care Remote4U (for Machine Tool Builder/ End Users)

This service enables real-time access to operation information of machines equipped with Mitsubishi Electric CNCs. It helps to reduce downtime by improving maintainability through remote diagnosis of user's machines equipped with our CNCs.

* Please contact your Mitsubishi Electric overseas office regarding which regions offer this service

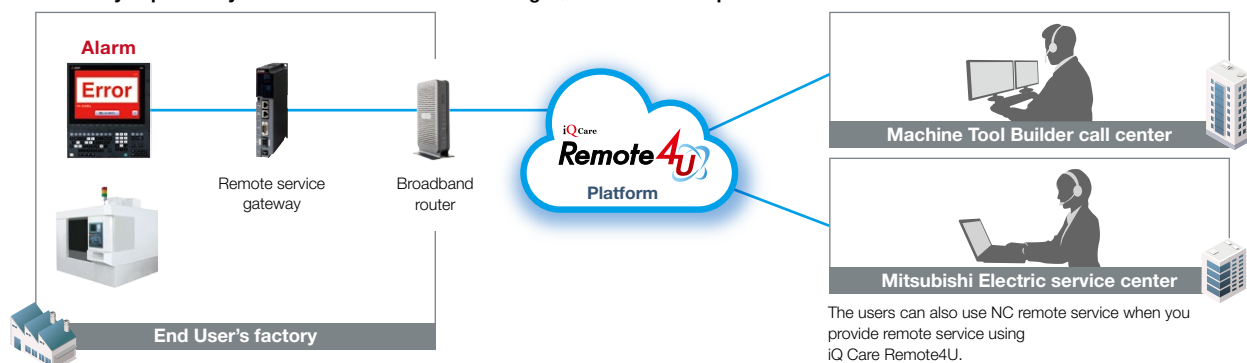


[CNC] Remote Service (for Machine Tool Builder)

You can provide remote service of your machine tools equipped with Mitsubishi Electric CNCs simply by purchasing platform license. You can save on the implementation and maintenance costs of remote service by using the cloud server provided by Mitsubishi Electric. You can also streamline your service work by implementing remote service.

iQ Care Remote4U platform

You can easily implement your machine remote service using iQ Care Remote4U platform

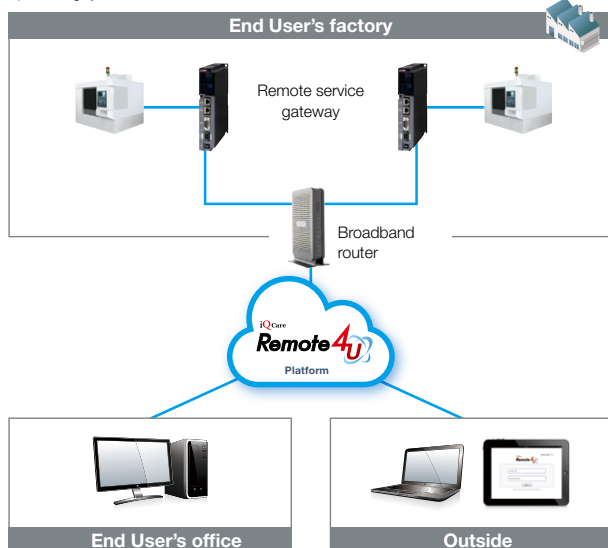


[CNC] Remote Service (for End Users)

Dashboard function*

Dashboard function helps you improve production process and reduce running costs
You can view real-time operation data of your machines equipped with Mitsubishi Electric CNCs.

* The specifications are different from the dashboard function for Mitsubishi Electric EDM and laser processing system.

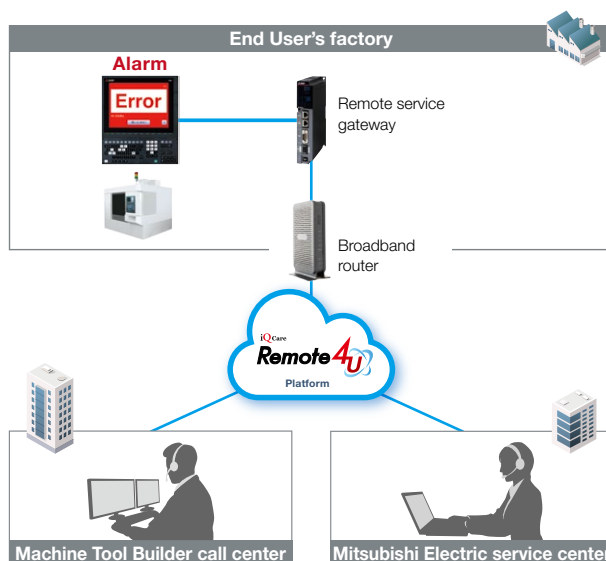


You can access the data via a web browser on your PCs, smartphones, and tablet PCs without installing dedicated software.
(ID and password must be entered.)

Remote diagnostics

Remote diagnostics improves maintainability

Mitsubishi Electric service center remotely supports the maintenance of Mitsubishi Electric CNCs on your machines.



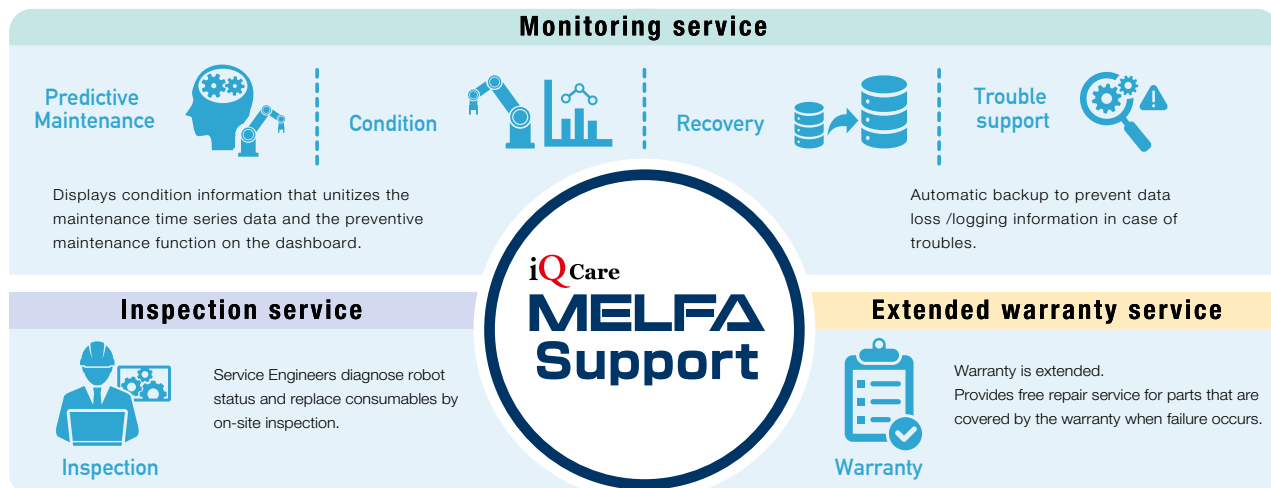
With a contract with an MTB that has the iQ Care Remote4U platform license, remote diagnosis of machines is also available.

iQ Care MELFA Support

This product is sold only in Japan as of June 2023 (Planned to be sold overseas sequentially). For more information on this product, contact your local sales office.

iQ Care MELFA Support is an option product that offers three services - monitoring, inspection, and extended warranty services for MELFA FR series/ CR series/ASSISTA robots. The monitoring service detects robot failures in advance by monitoring normal operation and detecting errors, contributing to productivity improvement. In addition to the robot inspection service, the extended warranty service is also provided for a stable operation of the robot system.

Three services - Supporting you and your MELFA robots together



Six plans - iQ Care MELFA Support plan options

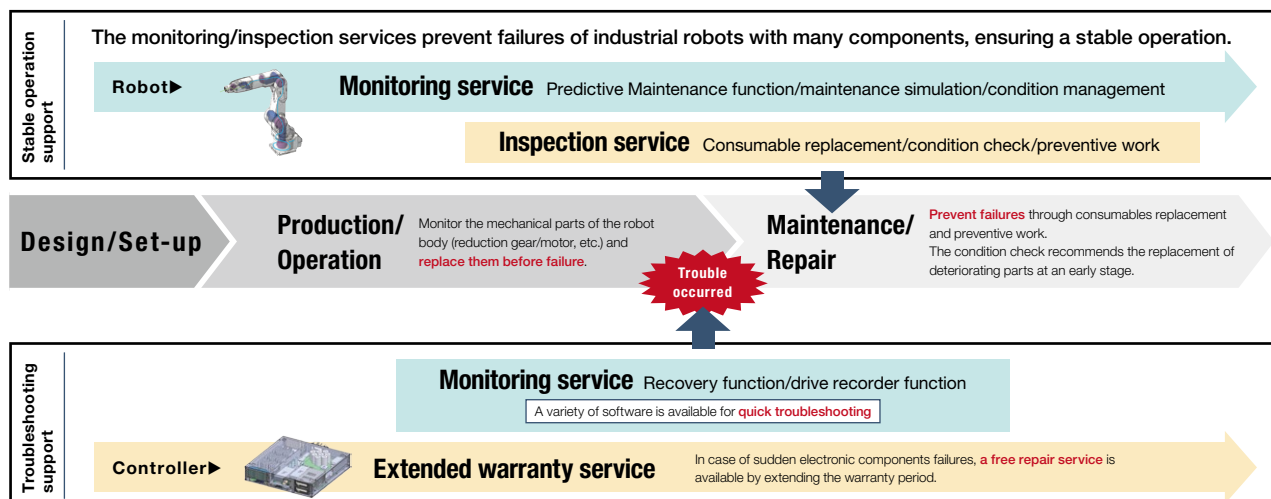
Plan option	Model	Monitoring service		Inspection service		Extended warranty service
		Predictive Maintenance function	Condition management function Recovery function Trouble support function	Simple inspection	Detailed inspection	Extended warranty
1-year extended warranty plan	RA-1W00M□□	1 year	Unlimited	Not provided	Not provided	1 year
2-year extended warranty plan	RA-2W00M□□	2 years				2 years
Inspection service simple inspection plan	RA-0W11M□□	1 year	Unlimited	Once	Not provided	Not provided
Inspection service detailed inspection plan	RA-0W21M□□			Not provided	Once	
1-year extended warranty + Inspection service simple inspection plan	RA-1W11M□□	1 year	Unlimited	Once	Not provided	1 year
1-year extended warranty + Inspection service detailed inspection plan	RA-1W21M□□			Not provided	Once	

* This product is also applicable to existing robots (the selectable plan varies depending on whether it is within the free warranty period or not). For details, refer to the catalog/manual.

* For details of supported robot models/supported software versions, refer to the catalog/manual.

* □□ is replaced by an alphabet representing the country.

Support for stable operations and quick troubleshooting



Cost effectiveness

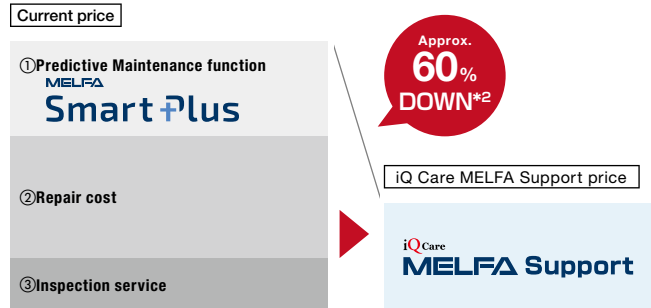
iQ Care MELFA Support is a cost-effective product offering the following services:

- ① "Predictive Maintenance function"^{*1} of MELFA Smart Plus, which is an option function for robots, is available. Furthermore, the newly-developed monitoring service is also available providing various software functions.
- ② Repair costs in case of sudden failure are covered by the extended warranty service.
- ③ The price includes inspection service fees, offering a great deal.

^{*1} The Predictive Maintenance function is available for one year or within the warranty period.

^{*2} This example shows the case when purchasing the Extended warranty service + Inspection service (simple inspection) plan and repairing parts that are covered by the warranty (CPU module).

^{*3} For parts that are covered by the warranty, refer to the catalog.



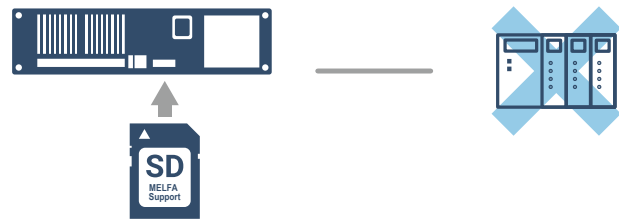
Easy setup

Purchase iQ Care MELFA Support as a robot option. Select from just six plan options without having to go through the troublesome procedure of exchanging contracts ^{*4}.

^{*4} Confirm the terms in the catalog prior to purchase.

For -R-Q type controllers, it is necessary to add a cable (prepared by the customer) between the controller and the CPU.

Change the parameters to enable the Predictive Maintenance function.

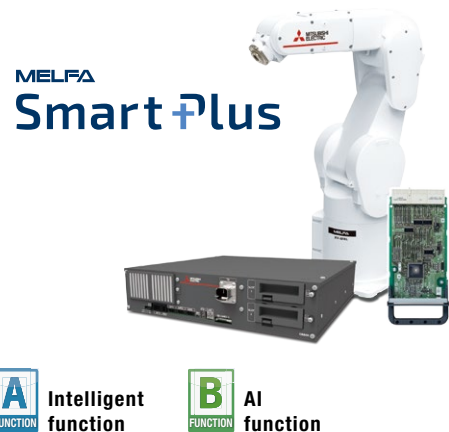


MELFA Smart Plus

MELFA Smart Plus is an option that brings next-generation intelligence to MELFA FR series/CR series robots. Inserting a MELFA Smart Plus card into a robot controller enables a multitude of intelligent functions.

■ MELFA Smart Plus functions

Predictive Maintenance function	Failing drive parts are detected before abnormalities in robot behavior become apparent. Downtime of production equipment is reduced.	
Preventive Maintenance function	Tracking the robot's operating status helps managing the robot's condition. Maintenance is now even more efficient.	
Enhancement function for force sense control	Parameters for the optimum operation pattern are found by training in a short amount of time. Set-up and tact times of a force sensor are reduced.	
MELFA-3D Vision enhancement function	Reduced startup time of the MELFA-3D vision thanks to automatic parameter adjustments which utilize our proprietary AI technology "Maisart".	
Calibration assistance function	Easy set-up of 2D vision sensors and improved job precision. Time-consuming teaching is automated improving also the accuracy.	
Coordinated control of additional axis	Coordinated operation between the robot and an additional axis makes it possible for the robot to work on workpieces that exceed its operating range.	
Robot mechanism thermal compensation function	Compensates for thermal expansion of the robot arm to increase position accuracy.	
2D vision sensor enhancement function NEW	A variety of vision applications make vision alignment set-up easy.	

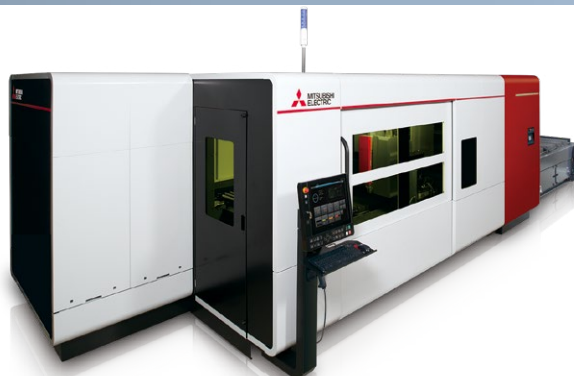


2-Dimensional Fiber Laser Processing Systems GX-F Series



Mitsubishi Electric Maisart proprietary AI technology determines the processing state based on sound and light detected during processing. For the first time in the world*, a function that automatically adjusts laser-processing conditions using AI is equipped on a laser-processing machine in pursuit of a "non-stop processing machine."

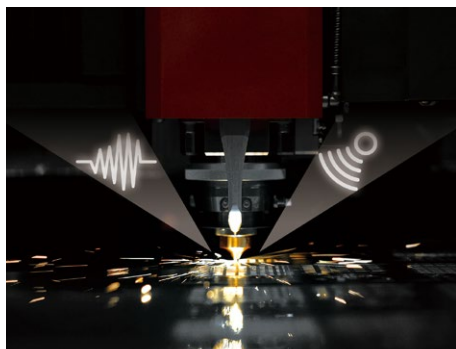
* According to in-house research as of April 2019.



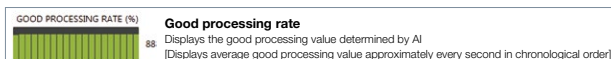
AIassist

AI Assist Function: Visualizing processing state through AI diagnostics

AI Assist diagnoses intermediate processing conditions in real time. The processing state is determined by setting good processing values displayed on the control device, and when processing falls below the predetermined value, a nozzle check is performed automatically. In addition, AI diagnostics enables operators to always be aware of the machining status.

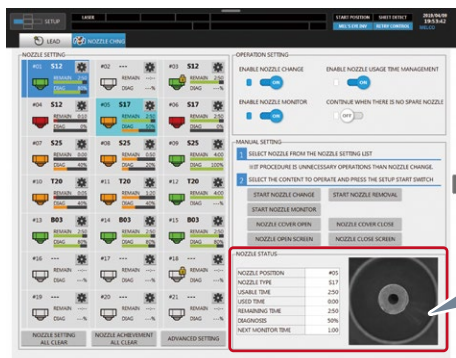


Quality of data measured during processing determined with AI

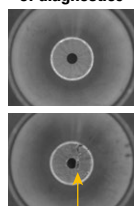


AI Nozzle Monitor Function: AI-based nozzle check and automatic replacement

If AI Assist detects a processing defect, the AI nozzle monitor automatically checks the nozzle status. An image of the nozzle projected on the nozzle monitor is collated with the data learned by AI to diagnose the degree of nozzle wear. The diagnostic result determines whether the nozzle status is "pass" or "fail," and a worn nozzle is automatically replaced.



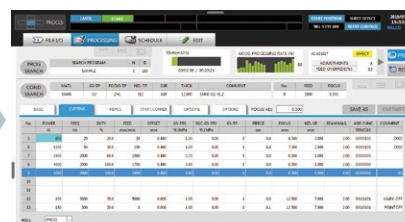
Examples of diagnostics



Minute differences in nozzle holes can also be diagnosed

Nozzle OK
Automatically adjusts processing conditions

Nozzle NG
Automatically changes nozzle using nozzle changer



[illegible]



PARTNERS

Partners



Broad knowledge and skill
as a comprehensive
FA manufacturer



Know-how of all fields
relating to monozukuri

Co-creation

Customer



Giving customers
back the values born
from co-creation



e-F@ctory Ecosystem – Co-creation with over 1100 Partners*

As a solutions provider, we collaborate with many partners across all monozukuri fields. This ecosystem provides optimal solutions in various regions and fields in response to the issues experienced by our customers.

*As of May 2024

Collaborating with the partners
across the world



Producing entire production systems
Achieving advanced systems integration



IT



Production shop floor



Robots



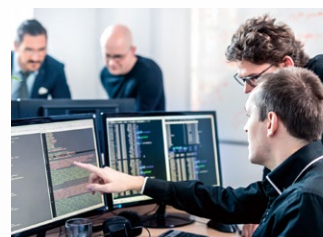
**Development of application software strengthening
connection affinity with Mitsubishi Electric FA devices**



ERP/MES/SCADA



CAD/CAM/3D simulator



Data analysis



Provide device compatibility with Mitsubishi Electric FA equipment
Achieve improved system builds and maintainability



Sensors



RFID



Related network devices

HMS Ewon Cosy+ Series

With the Cosy+ Series (remote access gateway) and Talk2M (cloud connection service), users can access Mitsubishi Electric FA devices from anywhere in the world and safely perform troubleshooting of equipment and devices, thus reducing support cost and downtime.

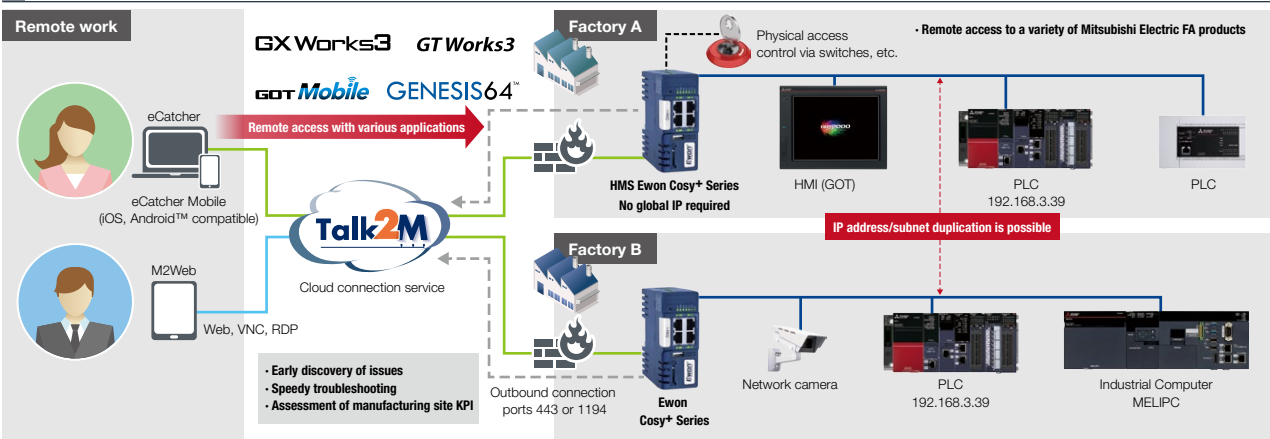
Setup is easy, not requiring any IT knowledge and will be finished in a few minutes. In addition to remote connection by PC, apps for tablets and smartphones are available.

It is possible to connect to MELEC or GOT from the browser of mobile terminals. A secure connection is achieved through measures such as hardware security implementation, exclusive outbound connection, two-layer authentication, connection audit tracing, and access control using physical external key switches. Additionally, HMS Ewon Cosy+ Series has obtained ISO27001 security certification as a third-party certification.

Moreover, assuming installation on a control panel, Ewon Cosy+ has been designed with specifications suited to industrial use, such as 24 VDC input, industrial EMC support, industrial operating temperature range, and DIN rail mounting.



Conceptual image of remote access



Reasons why the Ewon Cosy+ Series is the manufacturers' choice

Ranked most reliable service in the North American market for six consecutive years

Easy setup that only an FA manufacturer can provide

Overwhelming number of VPN servers for connection anywhere in the world

Safe and robust connection with hardware security

Highly experienced, enriched manufacturer support

Robust product specifications suited to industrial environments

Product data

Remote access gateway Cosy+				Free cloud service*1 Talk2M Free +	
Internet connection	Wired LAN	Wi-Fi	4G/LTE		
Product model	EC71330	EC7133J	EC7133M	Number of registered devices	Unlimited
Common specifications	RJ45 x 4 (10/100 Mbps), USB x 1, DI x 2/DO x 1 Rating 12 to 24 VDC, Operating temperature range -25 to 60 °C, DIN rail mounting			Number of registered users	Unlimited
				Number of concurrent views	5
				Number of concurrent connections	1
				Monthly data volume	3GB

* Antennas for 3G/4G models sold separately.

*1 Talk2M Pro is also available for a fee.



Flexy Series - Industrial IoT gateway for host models also included in the lineup

In addition to the Cosy+ remote access, this solution also facilitates smooth IIoT transition by collecting data from a remote manufacturing site and connecting individual cloud services with OPC UA, MQTT, etc.

Secomea SiteManager Series

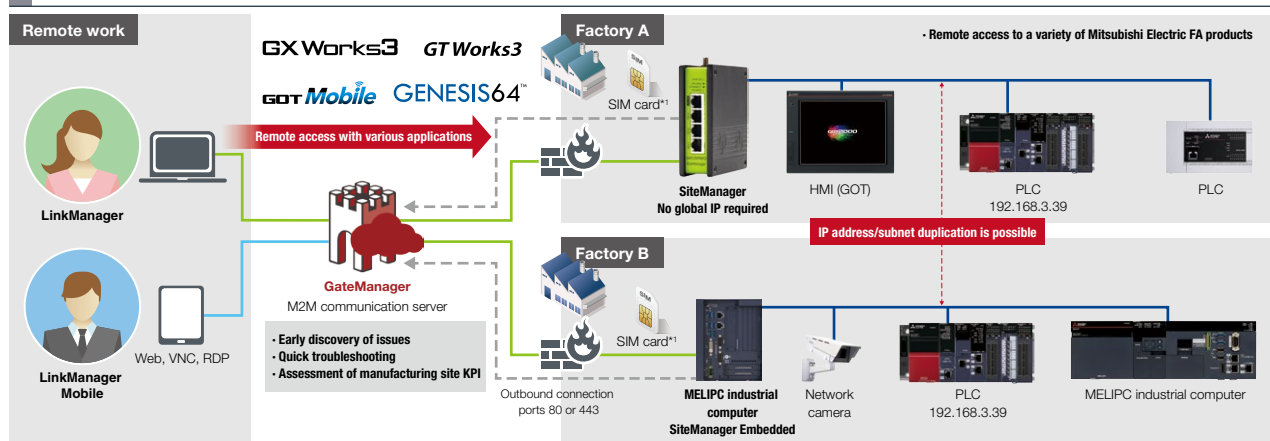
With SiteManager (remote access gateway), GateManager (relay M2M communication server), and LinkManager (client software), it is possible to access Mitsubishi Electric FA devices to monitor and perform maintenance on machinery and equipment at a manufacturing site, thus reducing business trip/transportation costs, and enabling quicker response.

A secure connection is achieved through measures such as exclusive outbound connection, encryption using SSL/TSL, multi-factor authentication using certificates, SMS, etc., access authority using an individual device, audit log, etc. The Secomea solution has obtained security certification from ProtectEM GmbH (a German third-party organization) and conforms to Industry 4.0. In addition to SiteManager's main unit being designed with a robust aluminum housing, SiteManager Embedded (embedded software) can be used to make industrial computers such as MELIPC, etc. function as a gateway.

secomea
SiteManager

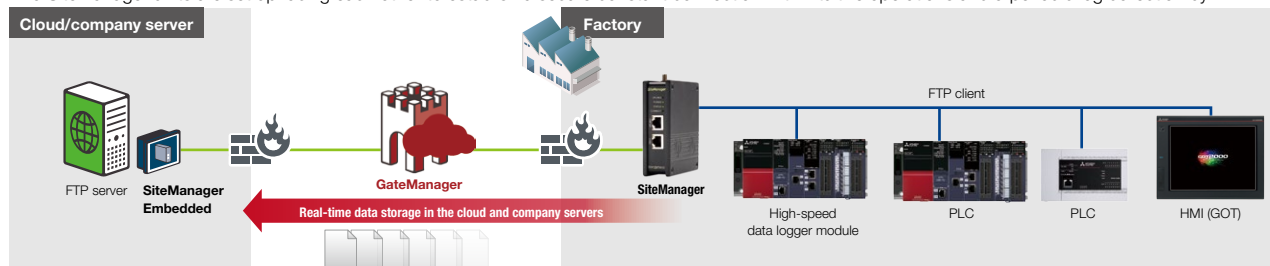


Conceptual image of remote access



Constant connection option "LogTunnel" use case

Two SiteManager units are set up facing each other to establish a secure constant connection with intuitive operations and a periodic log collection by FTP.



Not only FTP, but all protocols including HTTP, OPC UA, and MQTT can be used, and traceability systems as well as SCADA system construction are supported.

Secomea SiteManager also offers constant connection at the same time as maintenance of FA devices through remote access using LinkManager.

Lineup

With various versions available to suit the user's environment and purpose of use, SiteManager Embedded software can be installed and used on industrial devices.



SiteManager Model number		Internet connection method		
		LAN	3G/4G	Wi-Fi
Number of device connections	5	1129	1139	1149
	10	1529	1539	1549
	25	3329	3339	3349
	100	3529	3539	3549



Unlike the SiteManager hardware product, SiteManager Embedded is a software gateway that can be installed in a MELIPC, etc. to function as a secure access gateway. It operates as a seamless service in the background on various OS. SiteManager Embedded is very light, and therefore uses minimal system resources.

MEMO

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- Before using the products for special purposes such as nuclear power, electric power, aerospace, medicine or passenger-carrying vehicles, consult with Mitsubishi Electric.
- The products have been manufactured under strict quality control. However, when installing the products where major accidents or losses could occur if the products fail, install appropriate backup or fail-safe functions in the system.

Creating Solutions Together.



Low-voltage Power Distribution Products



Transformers, Med-voltage Distribution Products



Power Monitoring and Energy Saving Products



Power (UPS) and Environmental Products



Compact and Modular Controllers



Servos, Motors and Inverters



Visualization: HMIs



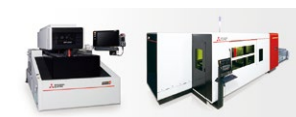
Edge Computing Products



Numerical Control (NC)



Collaborative and Industrial Robots



Processing machines: EDM, Lasers



SCADA, analytics and simulation software

Mitsubishi Electric's product lineup, from various controllers and drives to energy-saving devices and processing machines, all help you to automate your world. They are underpinned by software, innovative data monitoring, and modelling systems supported by advanced industrial networking and Edgecross IT/OT connectivity. Together with a worldwide partner ecosystem, Mitsubishi Electric factory automation (FA) has everything to make IoT and Digital Manufacturing a reality.

With a complete portfolio and comprehensive capabilities that combine synergies with diverse business units, Mitsubishi Electric provides a one-stop approach to how companies can tackle the shift to clean energy and energy conservation, carbon neutrality and sustainability, which are now a universal requirement of factories, buildings, and social infrastructure.

We at Mitsubishi Electric FA are your solution partners waiting to work with you as you take a step toward the realization of sustainable manufacturing and society through the application of automation. Let's automate the world together!

Sales office

MITSUBISHI ELECTRIC Factory Automation Global Website

► Locations Worldwide

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Mitsubishi Electric's e-F@ctory concept utilizes both FA and IT technologies, to reduce the total cost of development, production and maintenance, with the aim of achieving manufacturing that is a "step ahead of the times". It is supported by the e-F@ctory Alliance Partners covering software, devices, and system integration, creating the optimal e-F@ctory architecture to meet the end users needs and investment plans.



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