

FACTORY AUTOMATION

Visual Inspection Software MELSOFT VIXIO





Automating the World



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.

Concept 4

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Concerns in the inspection process

- ☑ Labor shortages increase the burden on inspectors
- ☑ Generational changes in inspectors make consistent visual inspection difficult
- ☑ Even though inspection is rule-based, overdetection is increasing

It would be good to introduce AI

if it wasn't so difficult to start without

specialized knowledge.

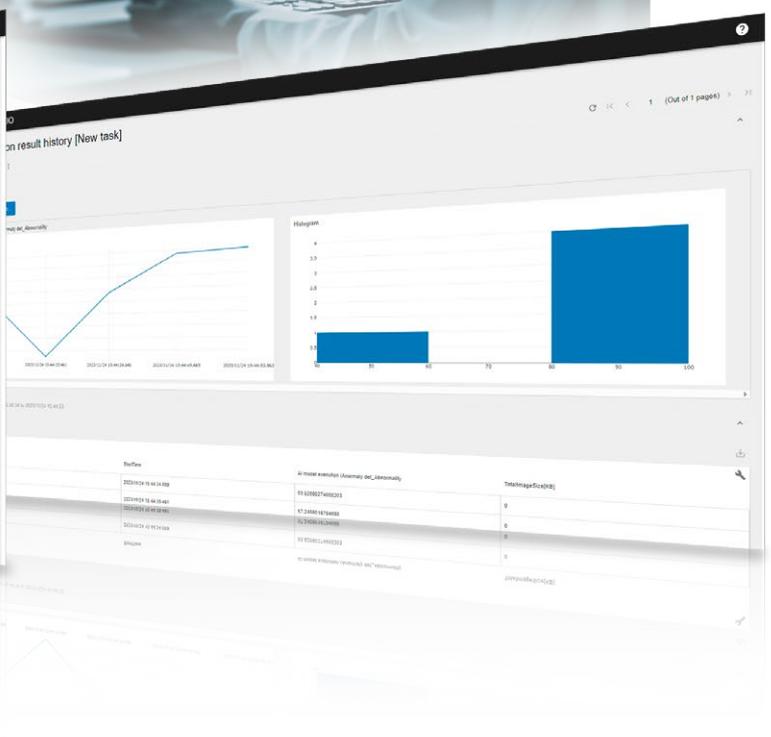
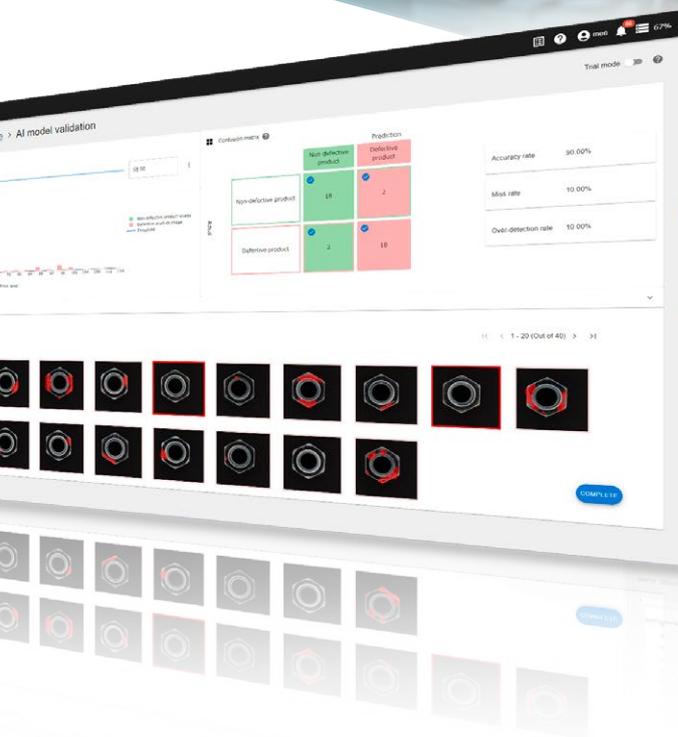
**The solution -
Visual Inspection Software**



MELSOFT VIXIO >>



Perform visual inspection easily and accurately with AI



Feature 1

Featuring a high-speed, high-precision AI algorithm ideal for factory automation

■ AI introduction challenge (1)

The limited number of defective product images complicates accuracy improvement. Generating AI models requires extensive image learning, making the process time consuming and inefficient.



■ With MELSOFT VIXIO

Easily generate AI models with high-speed, high-accuracy AI.

Anomaly detection

With conventional learning methods



To increase accuracy, it is necessary to learn from a large number of images, so the learning time is long and it is difficult to rebuild models.

Detect "Different from usual"

Anomaly detection
Learn from non-defective product images to remember "Features of non-defective products"



High-speed model generation in seconds

Inference results (heat map)

AI that detects differences from non-defective products

Point Even unexpected defects can be detected.

Defective point detection

With conventional learning methods



Although learning requires a large number of defective product images, it is difficult to obtain the necessary number of such images in the manufacturing industry.

Detect specific abnormality patterns

Defective point detection
Learn defects features



Model generation from even a single defective product image

Inference results (heat map)

AI that detects defects

Point Detection of similar defects even in different locations or with different sizes is possible.

Feature 2

Simple operation settings without programming

■ AI introduction challenge (2)

Even if an AI model could be generated, specialized programming is required to implement it in the system.



■ With MELSOFT VIXIO

Easily set up tasks in a flowchart format.

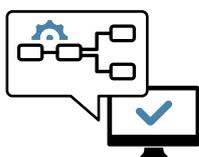
Settings from model generation to monitor screen creation can be performed with a single tool.



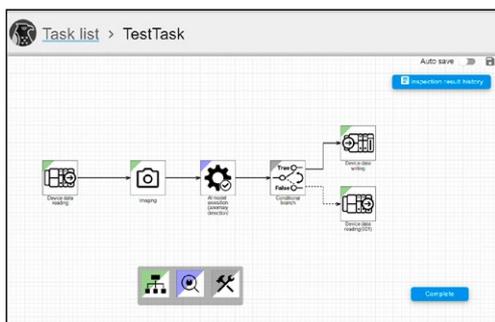
Easy system construction

All functions necessary to construct an AI visual inspection system can be easily set up without programming.

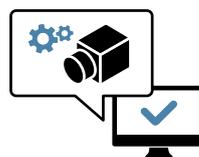
Setting the overall operation



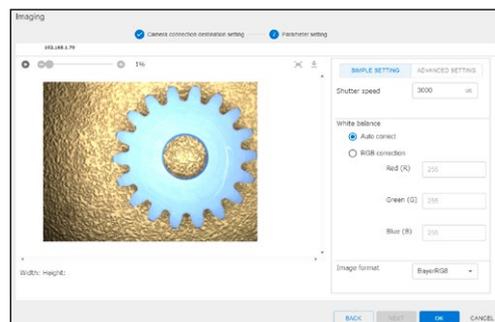
Point
Set the overall operation flow in a flowchart format.



Camera settings



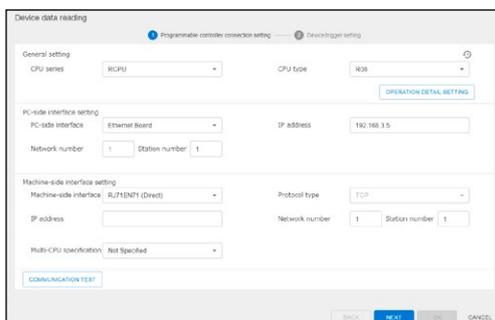
Point
GigE Vision® Area Scan Camera settings can be configured in the camera's various settings.



Settings for communication with programmable controllers



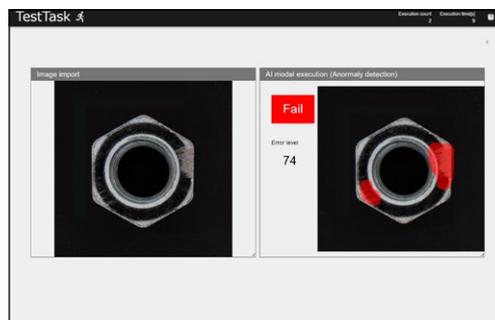
Point
Easy data exchange with various programmable controllers



Inspection monitor screen



Point
A monitor screen can be created by arranging the display elements of multiple monitors in a dashboard format.



Feature 3

Improved traceability

■ AI introduction challenge (3)

Ensuring traceability is difficult because different types of data are saved using separate tools.

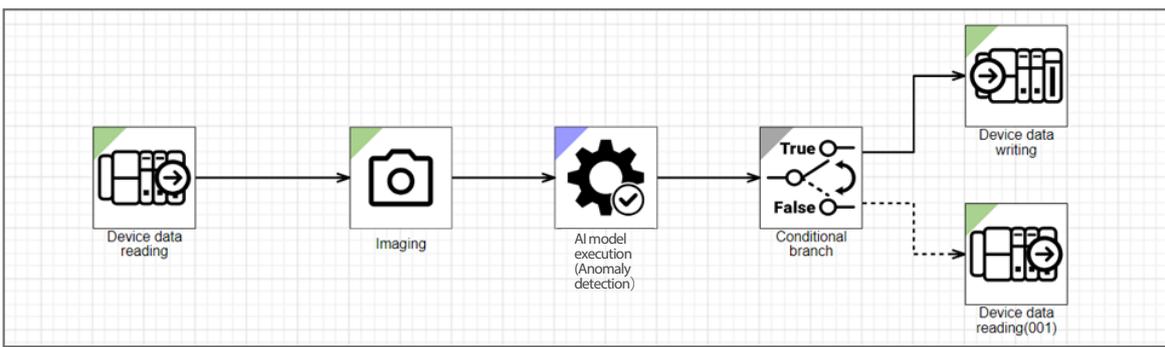


■ With MELSOFT VIXIO

Inspection date/time, programmable controller data, captured image, and inspection results are automatically linked and saved together in a group, for easy traceability.

Automatic linking and traceability

Data handled in inspection tasks can be easily linked and saved together in a batch.



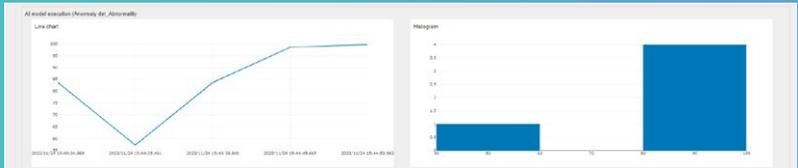
Point After creating an inspection task flow, simply select the data to save. Various programmable controller data such as manufacturing information, inspection results, and captured images can be automatically saved when the task is executed.



Check screen after task execution



Graph display



Point Inspection result history data can be graphically displayed and trends analyzed.

List display

INDEX	START TIME	AI MODEL EXECUTION (ABNORMALITY DETECTION RESULT)	INSPECTION HISTORY
0001	2023/12/14 10:34:00	00 (NORMAL)	0
0002	2023/12/14 10:34:01	01 (ABNORMAL)	0

Point Focus and view the data needed by filtering or searching saved data.

Application scenes

Combination of rule-based and AI-based inspections



Rule-based-only inspection

1/

When rule-based inspection is applied to items for which rules are difficult to define, numerous mis-detections occur.

AI replaces primary screening by human eyes, reducing



Sorting by human eyes and detailed inspection of defective products

2/

Products identified as "possible defectives" by human eyes in the primary sorting must also be checked by the person in charge of quality assurance, which requires task labor.

Reduce inspector workload by combining human and AI



Visual inspection process (by human eyes) by only one person

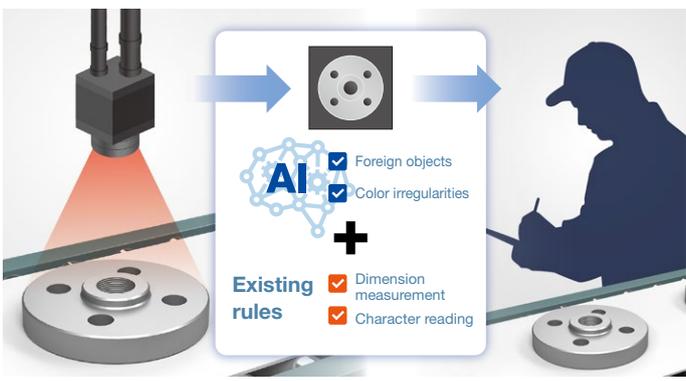
3/

One person in charge of inspection visually checks all products, which leads to overlooking of defective products due to heavy workload.

improves the accuracy of the inspection process

Combination of rule-based and AI-based inspections

Introducing MELSOFT VIXIO AI inspection and using it together with existing rule-based inspection improves inspection accuracy.



time and equalizing inspection quality

Perform primary screening with AI

Checking products identified in primary screening based on AI judgment results (heat map) reduces task labor.



inspection

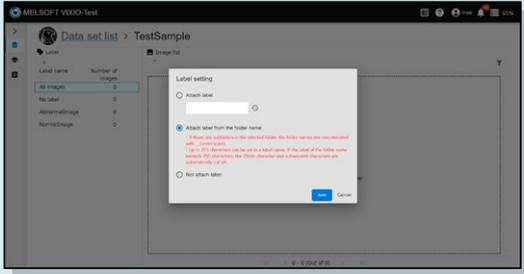
Double check by AI and human eyes

The introduction of double-checking reduces the risk of overlooking defective products and ensures consistency of quality between operators.

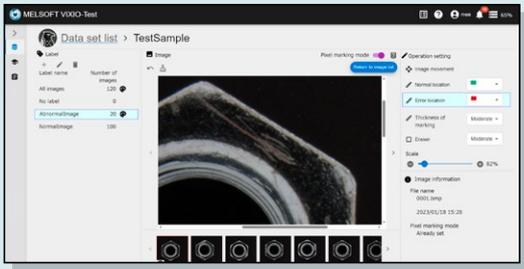


Learning phase

1. Data set registration

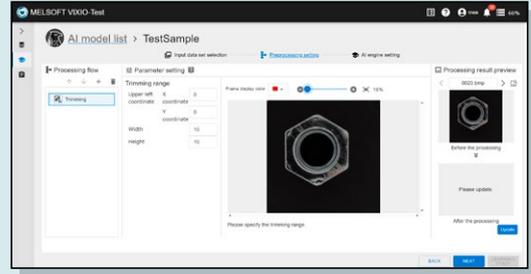


Labeling

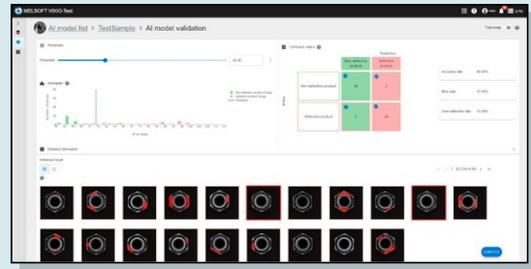


Pixel marking

2. AI model generation/validation



Preprocessing

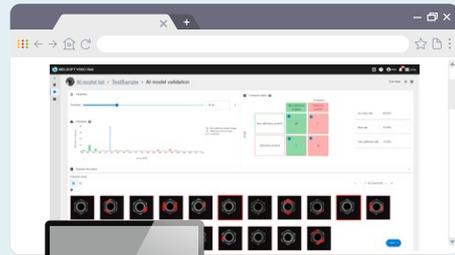


AI model validation

Apply AI model to

System configuration

Register images of inspection target workpieces in MELSOFT VIXIO and perform learning



Office computer (Web browser)

MELSOFT VIXIO

This product (development license)

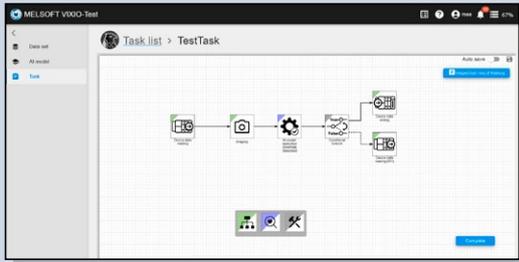
Learning computer



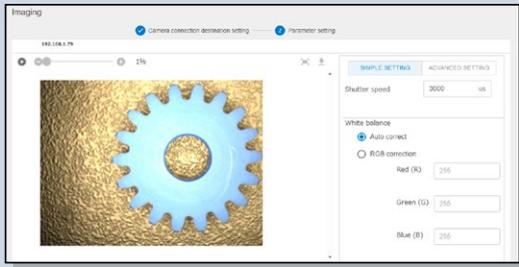
Generate AI model from image data

Inspection phase

3. Operation settings

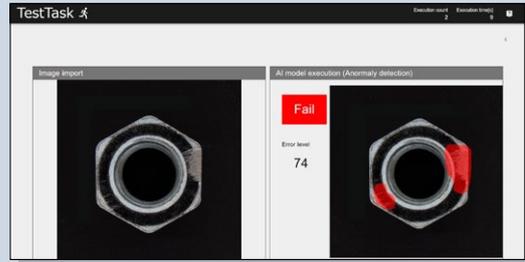


Flow settings



Camera settings

4. Inspection operation



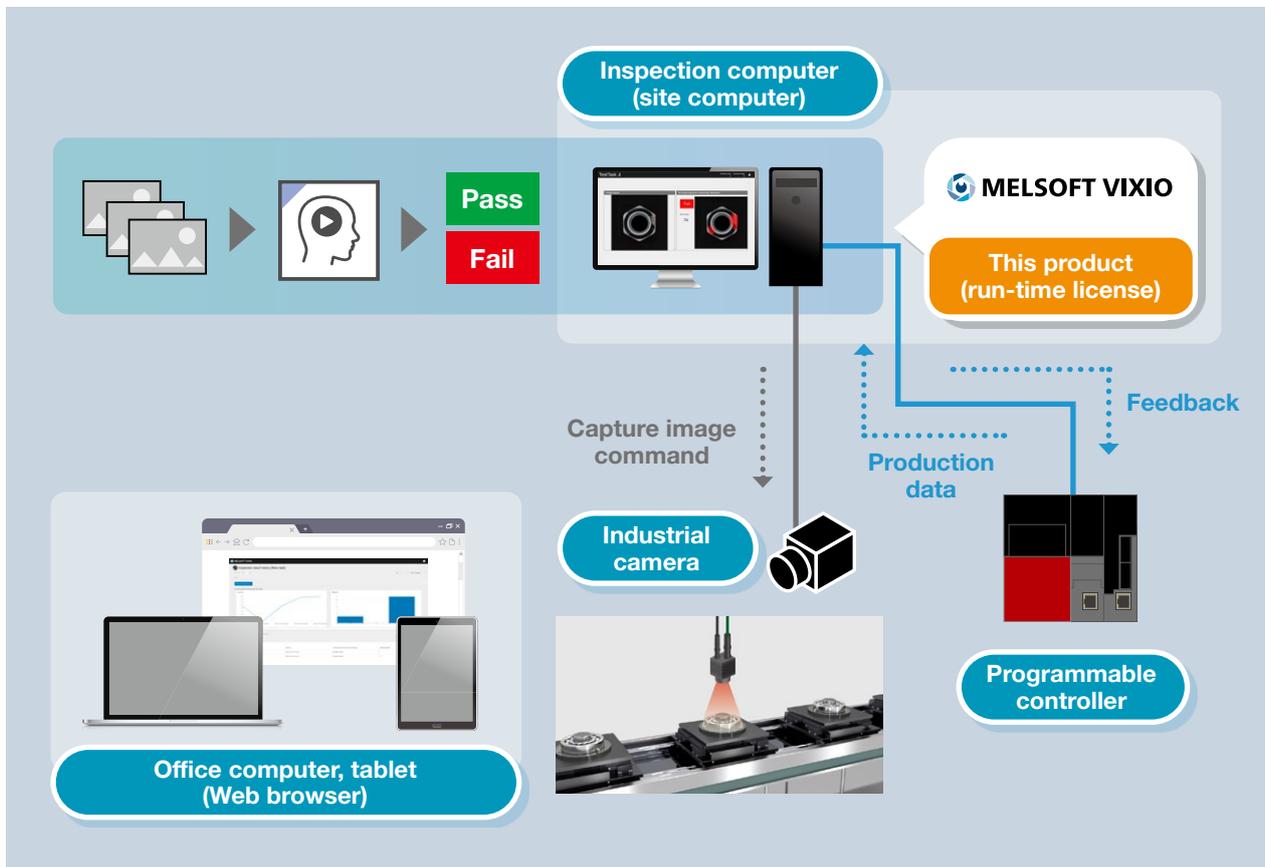
Task monitor



Inspection result history

the site

4 Operation processes



Product specifications

License system

Development license ^o		Run-time license ^o	
Period of use	Remarks	Period of use	Remarks
1 year	All functions can be used	Perpetual (one-time purchase)	Functions other than AI model generation can be used

*: Node-locked license for one computer

Computer specifications

Development license		
Item	Recommended	Minimum
CPU	Intel® Core-i7™ 9th generation (October 2018) or higher	Intel® Core-i5™ 9th generation (October 2018) or higher
GPU	NVIDIA GPU Ampere Architecture or higher Memory: 8 GB or more	NVIDIA GPU Pascal™ Architecture or higher Memory: 6 GB or more
Memory	32 GB or more	16 GB or more
OS (64-bit version)	Microsoft® Windows® 10 Version 21H2 or later (Pro, Enterprise) Microsoft® Windows® 11 Version 21H2 or later (Pro, Enterprise)	
Free storage space	512 GB or more	256 GB or more

Run-time license		
Item	Recommended	Minimum
CPU	Intel® Core-i7™ 9th generation (October 2018) or higher	Intel® Core-i5™ 9th generation (October 2018) or higher
GPU	NVIDIA GPU Pascal™ Architecture or higher Memory: 6 GB or more	NVIDIA GPU Pascal™ Architecture or higher Memory: 4 GB or more
Memory	16 GB or more	8 GB or more
OS (64-bit version)	Microsoft® Windows® 10 Version 21H2 or later (Pro, Enterprise) Microsoft® Windows® 11 Version 21H2 or later (Pro, Enterprise)	
Free storage space	256 GB or more	128 GB or more

Specifications

	Item	Development license	Run-time license
General	Number of projects	16 projects/computer	
	Number of users	16 users/computer	
Data sets	Number of sets	16 sets/project	-
	Number of registered images	10,000 images/set	-
	Registrable image formats	jpg, jpeg, png, bmp	-
	Registrable image size	Max. 10,000 pixels horizontally and vertically	-
AI models	Number of sets	16 sets/project	-
	Number of simultaneously executable learning processes	8 models/computer ^{*1*2}	-
Tasks	Number of sets	16 sets/project	
	Number of simultaneously executable tasks	4 tasks/computer	
	Number of executable AI	8 models/task ^{*1*3}	
	Number of connectable cameras	8 units/computer ^{*4}	
	Number of connectable programmable controllers	8 units/computer	

*1: 4 models each for anomaly detection and defective point detection.

*2: Defective point detection uses 2.4 Gbytes of GPU memory per model.

*3: Tasks using defective point detection use 2.4 Gbytes of GPU memory per task.

*4: When multiple cameras are connected, phenomenon such as noise may occur in images due to resolution or network conditions. It is recommended that network cards be separated.

■ Connectable industrial camera specifications

Hardware standards	Software standards
Conforms to GigE Vision® (Ver. 2.0)	Conforms to GenICam™ (Ver. 3.2.0)

Note 1: For information on usable industrial cameras, please refer to Technical Bulletin FA-A-0419.

Note 2: "Connectable" means the following:

- Camera-side parameters (exposure time or white balance) can be adjusted in this product.
- Image capture command can be issued directly by this product.

Since it is possible to browse to a folder on the computer and perform AI inspection on stored images, cameras which do not meet the above specifications can also be used.

■ Mitsubishi Electric FA Global Website Visual Inspection Software MELSOFT VIXIO

Mitsubishi Electric FA Global Website: www.MitsubishiElectric.com/fa

Trial version download

A trial version of MELSOFT VIXIO can be downloaded from the Mitsubishi Electric FA Global Website.

www.MitsubishiElectric.com/fa/products/software/image-processing/vixio/index.html



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Discover the latest information in Factory Automation

Factory Automation Global website

Mitsubishi Electric Factory Automation provides a mix of services to support its customers worldwide. A consolidated global website is the main portal, offering a selection of support tools and a window to its local Mitsubishi Electric sales and support network.

From here you can find:

- Overview of available factory automation products
- Library of downloadable literature
- Support tools such as online e-learning courses, terminology dictionary, etc.
- Global sales and service network portal
- Latest news related to Mitsubishi Electric factory automation



Mitsubishi Electric Factory Automation
Global website:
www.MitsubishiElectric.com/fa

Online e-learning

An extensive library of e-learning courses covering the factory automation product range has been prepared. Courses from beginner to advanced levels of difficulty are available in various languages.



Beginner level

Designed for newcomers to Mitsubishi Electric Factory Automation products gaining a background of the fundamentals and an overview of various products related to the course.

Basic to Advanced levels

These courses are designed to provide education at all levels. Various different features are explained with application examples providing an easy and informative resource for in-house company training.

Find information on products, factory automation, e-F@ctory solutions and other topics

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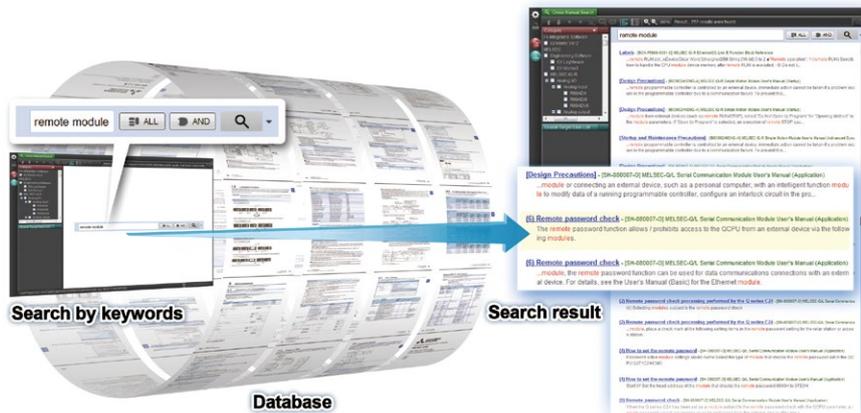
X



Innovative next-generation, e-Manual

e-Manual Viewer

The e-Manual viewer is a next-generation digital manual offered by Mitsubishi Electric that consolidates factory automation products manuals into an easy-to-use package with various useful features integrated into the viewer. The e-Manual allows multiple manuals to be cross-searched at once, further reducing time for setting up products and troubleshooting.



Key features included

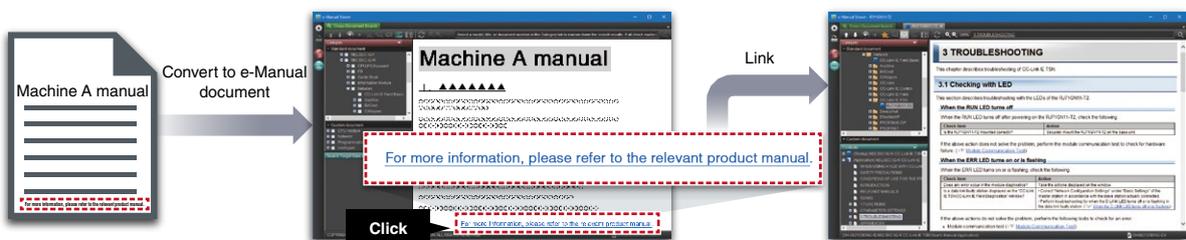
- One-stop database containing all required manuals, with local file cache
- Included with GX Works3 engineering software
- Also available in tablet version
- Easily download manuals all at once
- Multiple users can share the latest manuals and knowhow with document sharing function
- Directly port sample programs within manuals to GX Works3
- Downloaded manuals are usable offline

Windows®-compliant



e-Manual Create

e-Manual Create is software for converting word files and chm files to e-Manual documents. e-Manual Create allows users to directly refer to Mitsubishi Electric e-Manuals from user's customized device maintenance manuals and such, supporting quick troubleshooting and reduction in document creation process.



Windows®-compliant



* To obtain the Windows® version of e-Manual Viewer and e-Manual Create, please contact your local Mitsubishi Electric sales office or representative.

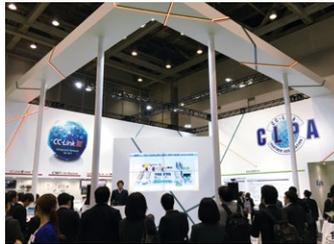
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Seminar



Trade show



Conformance testing lab

Visit the CLPA website for the latest CC-Link information.



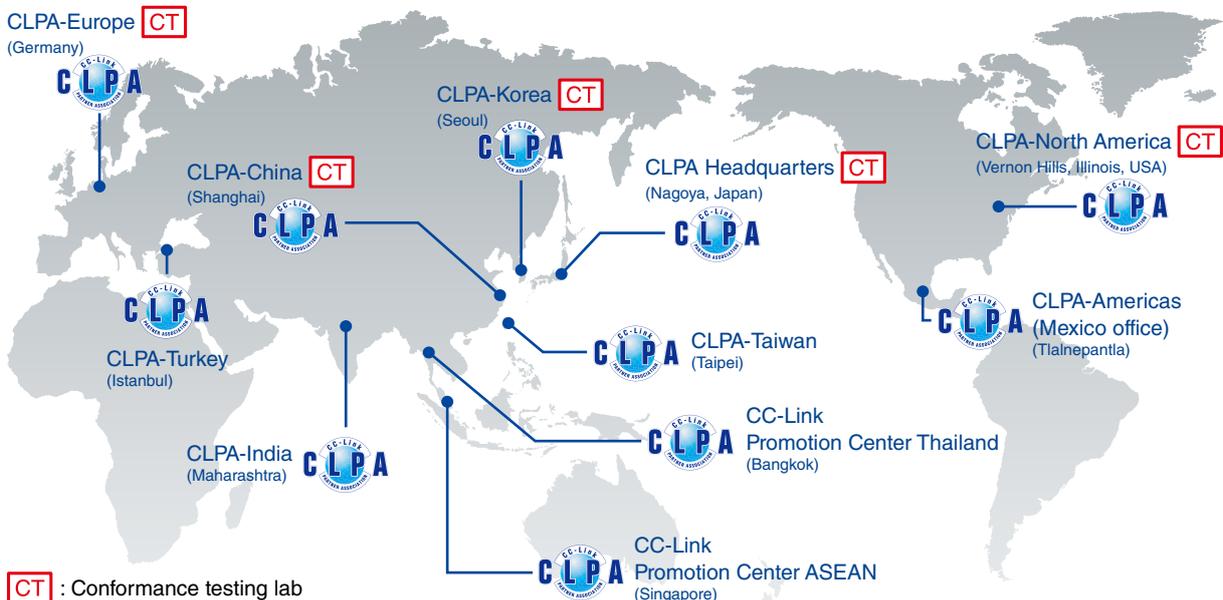
CLPA website
www.cc-link.org/en



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Global influence of CC-Link continues to spread

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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!

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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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