FA Application Package
iQ Monozukuri Smart Work Navigator

e-F@ctory

▶ **Applicable to various work support systems!**

▶ **Work instruction sheets are easily created with SWN Data Configurator!**

▶ **Work records visualization with the BI tool supports analysis and improvement!**

iQ Monozukuri

GLOBAL IMPACT OF MITSUBISHI ELECTRIC

Through Mitsubishi Electric's vision, "Changes for the Better" are possible for a brighter future.

Changes for the Better

We bring together the best minds to create the best technologies. At Mitsubishi Electric, we understand that technology is the driving force of change in our lives. By bringing greater comfort to daily life, maximizing the efficiency of businesses and keeping things running across society, we integrate technology and innovation to bring changes for the better.

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.

e-F@ctory

e-F@ctory is a concept for a further step on "Monozukuri", which reduces the total cost for development, production, and maintenance, and continuously supports improvement activities of the customer by utilizing the FA technology and IT technology.
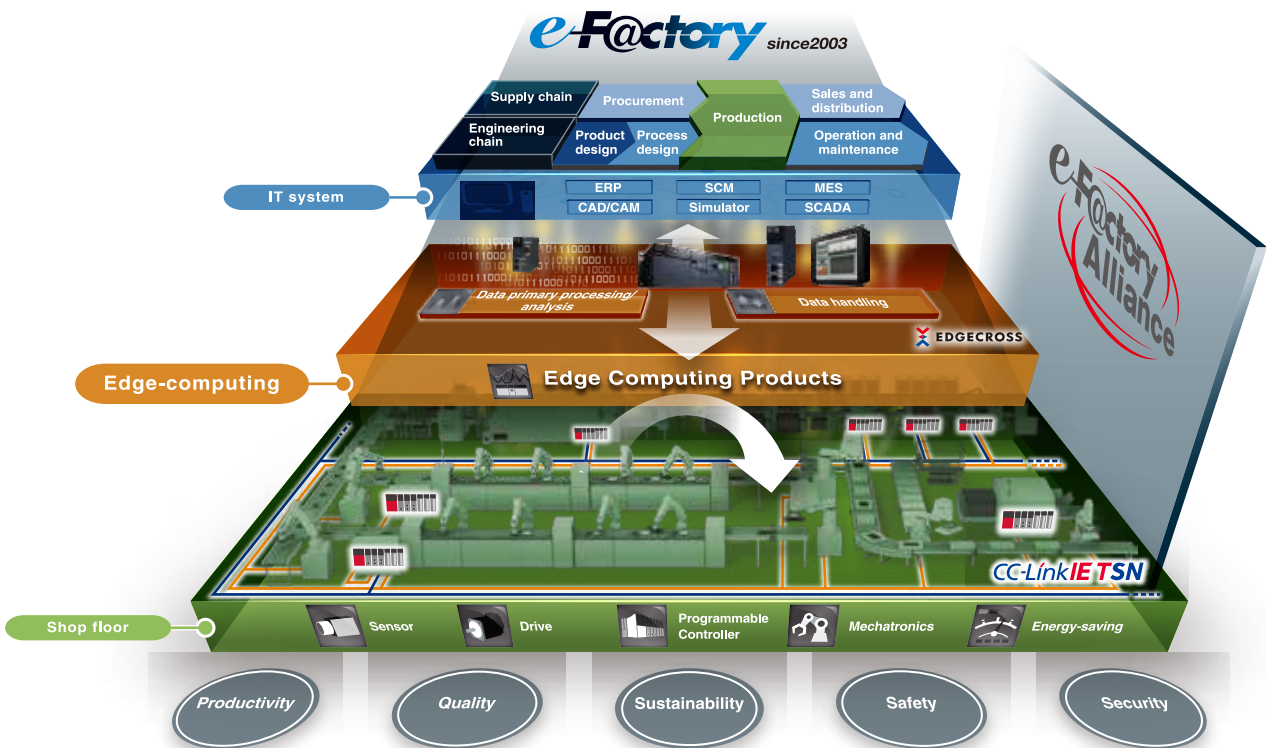
In the increasingly complex manufacturing sites, coordination between "Man" and "Machine" through the best use of information from the production site is a key concept.

Productivity and quality can be improved not only with the information obtained from the devices at the production site, but the improvement triggered by on-site notice and flexible human actions. Similarly, automatic adjustment of equipment based on the information recognized by human is indispensable for the promotion of automation.

We have realized the "Next-generation manufacturing" through the use of the "e-F@ctory" information proposed by Mitsubishi Electric, the effective and flexible manufacturing realized through the coordination between man and machine, and the optimization of the production site, and the entire supply chain and engineering chain.
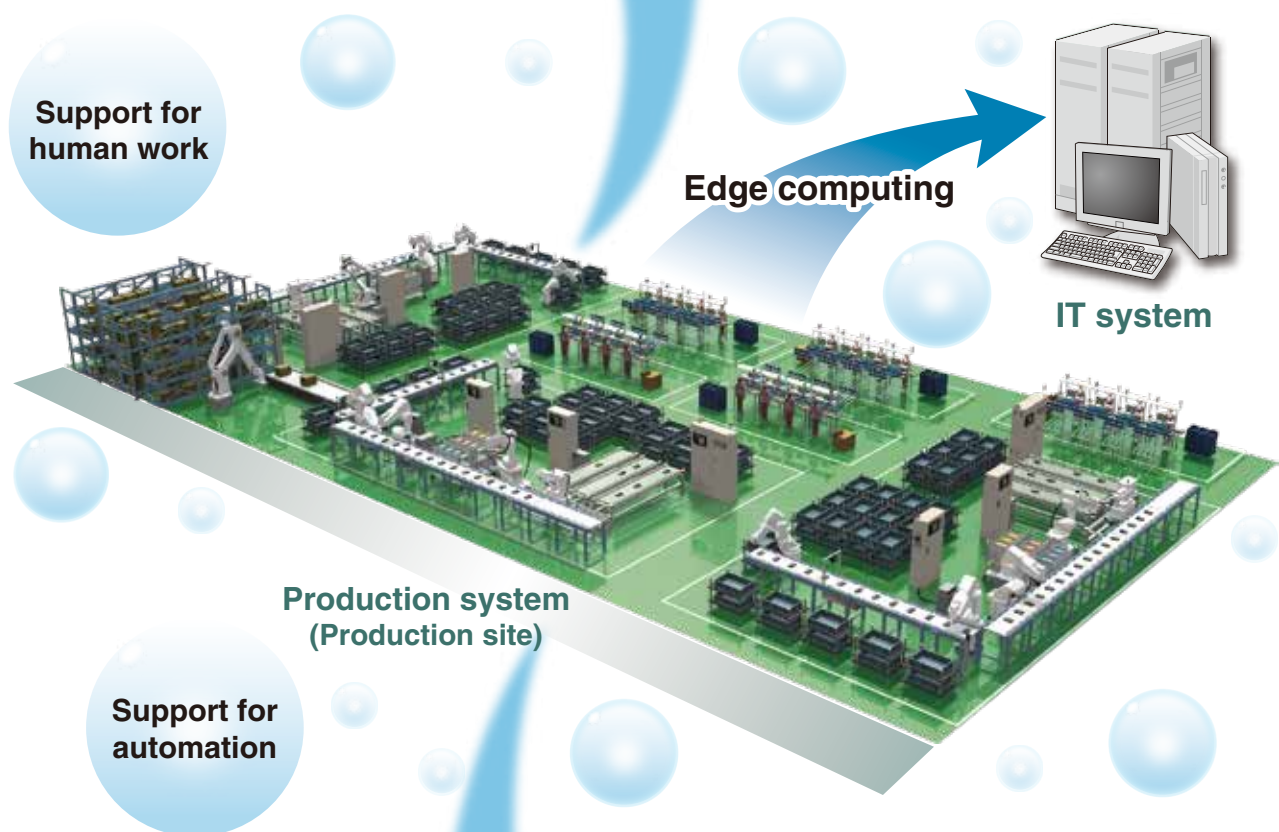
" iQ Monozukuri " is a step toward achieving e-F@ctory.

The FA application package "iQ Monozukuri" is a product that has been optimized through the accumulation of knowhow, which supports various problem solutions of the customer during manufacturing, and enables effective system installation, expansion, and operation/maintenance.

What iQ Monozukuri provides

- A wide range of applications prepared by "process", "usage", and "equipment"
- Know-hows and ideas about "Monozukuri" accumulated by Mitsubishi Electric and our partners over the years
- System consisting of highly reliable FA products manufactured by Mitsubishi Electric and partner companies

Support for human work

Edge computing

IT system

Production system (Production site)

Support for automation

FA products

Mitsubishi Electric has been making persistent technical innovations from small-batch production systems to the developed flexible production systems in order to comply with the needs of the customers. It offers a wide range of extremely diverse FA products from control devices, driving devices, energy-saving support devices, and power distribution control devices to industrial mechatronics. It plays an active part in every production site for the purpose of automation, energy-saving, and quality improvement.

Control devices	Driving devices	Display devices(HMI)	Industrial robots	Low-voltage power distribution control devices	Processing machine

FA Application Package Features of iQ Monozukuri Smart Work Navigator

It supports all phases including installation, operation, analysis, and improvement in order to perform picking or screw tightening work effectively and properly!

Installation

### Flexible system configuration, Creation of work instruction sheet

- Quick startup with the screen data and control program included in the package!
- System construction according to the usage or scale!
- Work instruction sheets are easily created and managed with SWN Data Configurator!

Operation

Improvement in productivity and quality, Collection of work records

- Display device navigates work details and procedures!
- Lamps indicate which part or tool should be used!
- Work records are collected in the database!
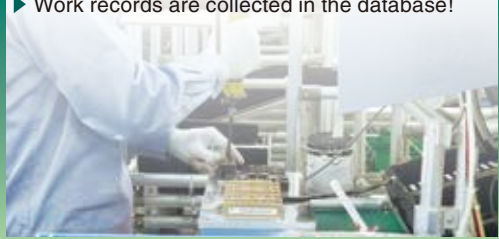
Improvement

Re-training of workers, Revision of process and design

- The cause of the problem is investigated!
- An improvement plan is proposed and implemented!

Analysis

Analysis by the BI tool*[1]

- Work records accumulated in the database are visualized with the BI tool*[1]!
- Problems of production delay or defective parts are extracted by analyzing from various perspectives!

*1: Business intelligence tool

Repeating these procedures leads to further

"improvement in productivity and quality".

Quick Steps from System Design to Startup!

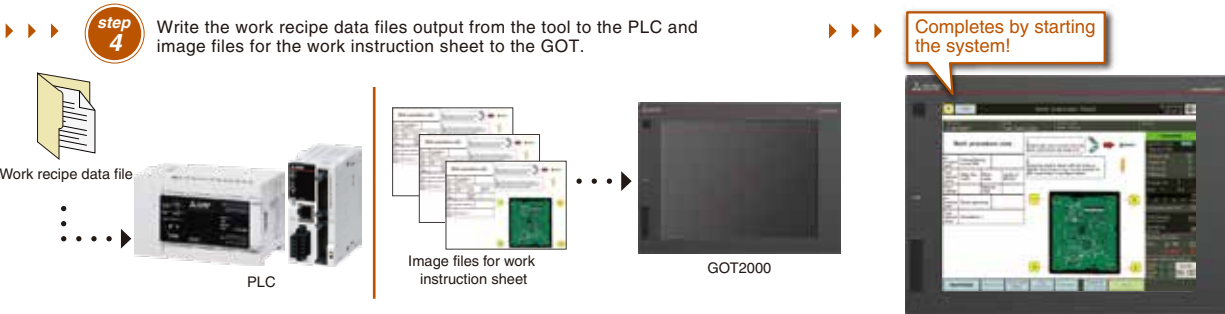## ▶ Quick installation with the project file and tool included in the package!

The project file (screen data and control program) and SWN Data Configurator are included in the product package. They can be used simply by writing to the GOT, writing to the PLC, creating the definition files and creating the work instruction sheets. [1]

[1]: It is necessary to request a license key beforehand and write it to the PLC.

The start-up procedure differs depending on the display device used.
The following describes the procedure using the GOT.

step 1 Write the screen data to the GOT.

Screen data
GOT2000

step 2 Write the control program to the PLC.

Control program
MELSEC iQ-F PLCs

step 3 Create work recipe data files and image files for the work instruction sheet with "SWN Data Configurator". [2]

[2]: It is necessary to create definition files beforehand.

step 4 Write the work recipe data files output from the tool to the PLC and image files for the work instruction sheet to the GOT.

Work recipe data file
PLC
Image files for work instruction sheet
GOT2000
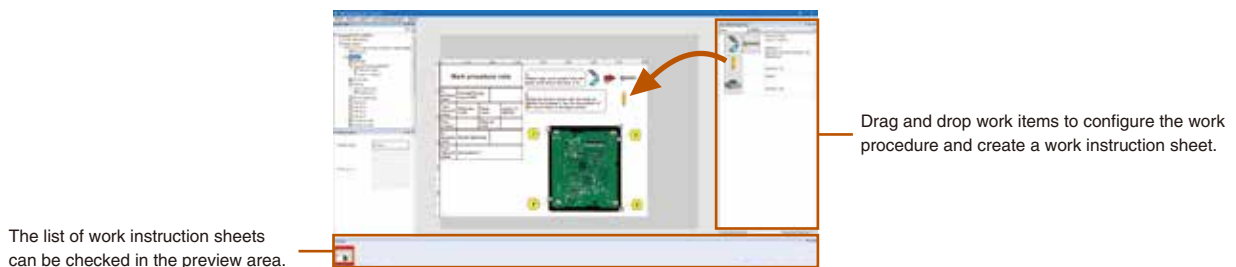
Completes by starting the system!

▶ Flexible system configuration

Devices can be selected according to the usage or scale.

PLC
iQ-F Series

Display device
GOT
General purpose display (SoftGOT)

POKAYOKE terminal
• Push button type
• Door open/close type
• Transmission type
• Touch type, etc.

General purpose devices
Barcode reader   Signal tower   Buzzer   Switch   Lamp

Electric screwdriver
• AnyWireASLINK-compatible type
• External I/O signal type

Electric screwdriver with built-in torque sensor
Built-in torque sensor type

Torque checker

▶ Work instruction sheets are easily created and managed with SWN Data Configurator!

With SWN Data Configurator, a work instruction sheet can be created by simply dragging and dropping system components and work parts.

Drag and drop work items to configure the work procedure and create a work instruction sheet.

The list of work instruction sheets can be checked in the preview area.

Navigation of Picking and Assembly Work!
Collection of Work Records

▶ ## Lamps indicate which part or tool should be used!
Display device navigates work details and procedures!

Advantages

✓ The time loss on selection of parts and tools can be eliminated!
(Case of Mitsubishi Electric's production site)

✓ Errors such as incorrect mounting can be eliminated! (Case of Mitsubishi Electric's production site)

✓ The quality is improved as beginners can work like veterans!

● In the case of picking work

Stockout prevention with an alarm on the signal tower

Avoiding stockouts thanks to an alarm triggered by stock shortage.

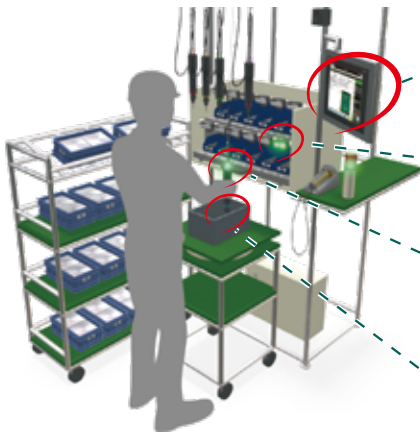**Wrong supply prevention with door-type shelves**

Door-type POKAYOKE terminals on the supply side prevent wrong parts supply.

Lamp indication of parts to be picked up

Lamp indication of the target parts shelf helps beginners to choose parts.

● In the case of screw tightening work

Work instruction display on the screen for screw tightening, etc

Screen display of work procedure such as screw tightening helps beginners to perform work.

Lamp indication of parts to be used

Lamp indication of the target screw (parts) shelf helps beginners to choose parts.

Lamp indication of electric screwdriver to be used

Lamp indication of electric screwdriver to be used saves time for tool selection.

Tightening failure prevention by torque judgment[*1]

Real-time judgment of tightening torque during screw tightening prevents delivery of defective products.
Pre-operation inspection of tightening torque is possible in combination with a torque checker.

*1: It is necessary to create a communication program between the driver with built-in torque sensor / torque checker and a PLC.

▶ ## Work records are collected in the database!

The work records of picking and screw tightening are collected in the database server.

Work record   Work record   Ethernet

Work site   Database server
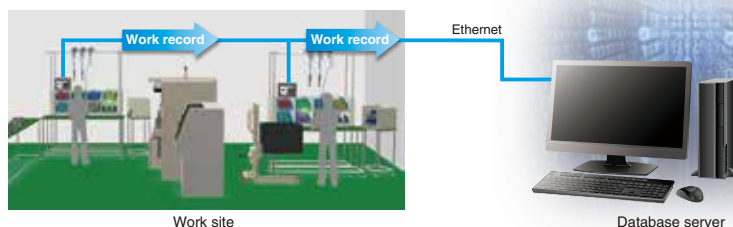
Collected Work Records are visualized and Problems are Extracted

With the BI tool, the work records are visualized in accordance with the purpose of the manager.
Examples of screens of the BI tool are shown below.

Average cycle time graph

This graph displays the average work time (average cycle time) from work start to work completion and the standard work time for each model, worker, process, and work table.

▶ **Effect**
Identifying the points to be improved

Alarm occurrence rate graph

This graph displays the alarm occurrence rate of each date, model, or worker.
The number of occurred alarms depending on the cause can be checked in the alarm cause graph.

▶ **Effect**
Early problem detection, Improvement check

Screw tightening time graph

This graph displays the minimum/maximum/average values of the screw tightening time for each process.

▶ **Effect**
Work efficiency improvement, Planning a training

Growth curve graph

This graph displays the transition of the work record time per product.

▶ **Effect**
Worker's skill check

Stock alarm occurrence status graph

The upper graph displays the stocks and the stockout warning threshold for the parts shelf which causes a stockout alarm or stockout/stock warning in the selected work table.
The lower graph displays the stocks on all the parts shelves in the selected work table.
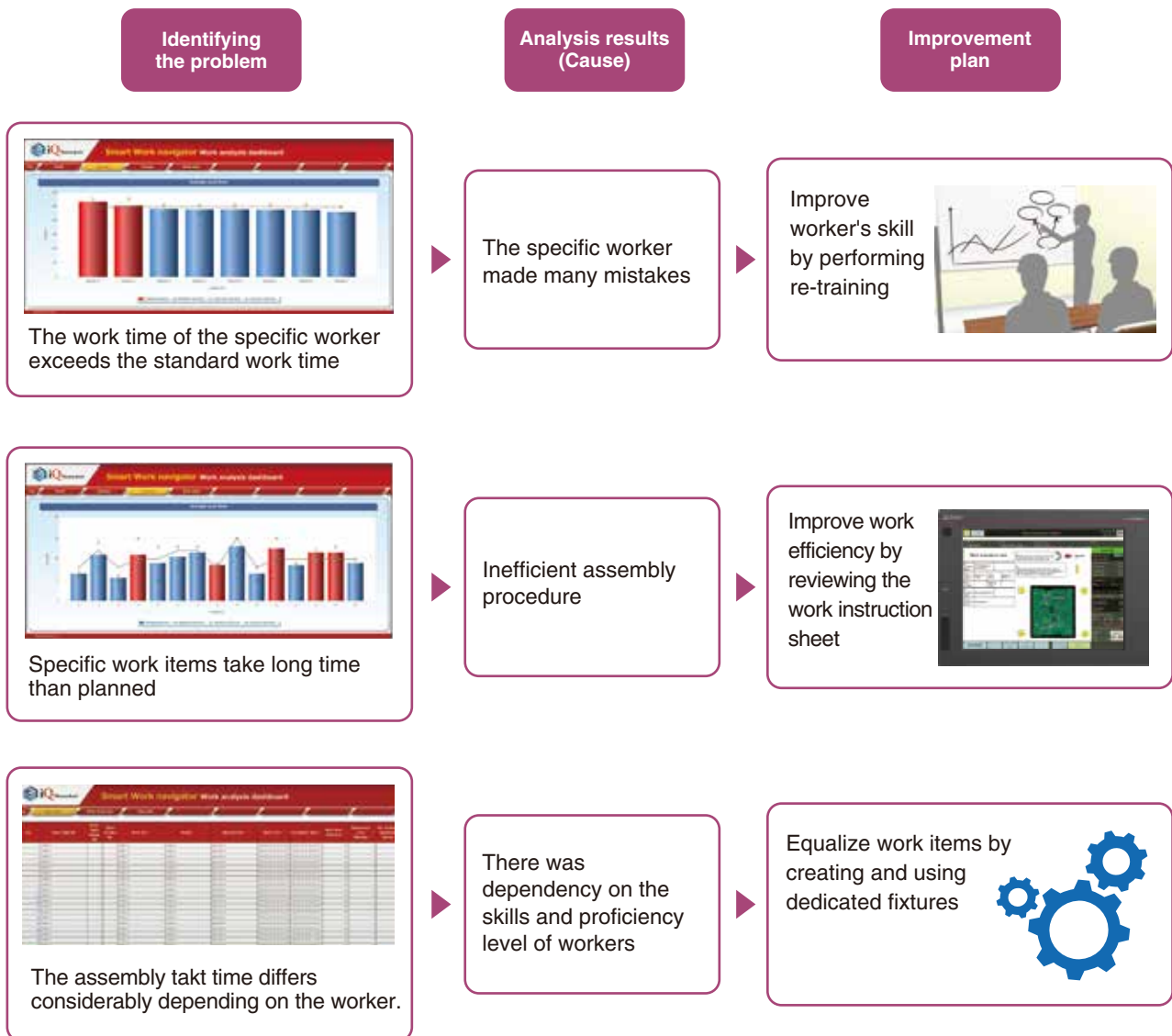
▶ **Effect**
Control of stocks, Stockout prevention

The following list screens can be used as well.
Work record list screen / Work process list screen / Order progress status list screen / Alarm list screen

The cause of the problem is investigated and an improvement plan is proposed and implemented

The work items that tend to be problematic, such as "work items that tend to fail" and "work items that take time" can be identified on the basis of data visualized by the BI tool. As a result, specific activities for improvement, such as "Re-training of workers" or "Revision of work processes" can be made.

Identifying the problem	Analysis results (Cause)	Improvement plan
The work time of the specific worker exceeds the standard work time	The specific worker made many mistakes	Improve worker's skill by performing re-training
Specific work items take long time than planned	Inefficient assembly procedure	Improve work efficiency by reviewing the work instruction sheet
The assembly takt time differs considerably depending on the worker.	There was dependency on the skills and proficiency level of workers	Equalize work items by creating and using dedicated fixtures

A specific improvement plan can be seen as in the example above!

Installation Example of the Product

Effect of installation   In addition to the fact that stock management error and assembly defects are eliminated, the following effects are also provided.

1 The number of assembled units from the start of training until mastering the work is **reduced by 22%**

2 The training time is **reduced by 65%**
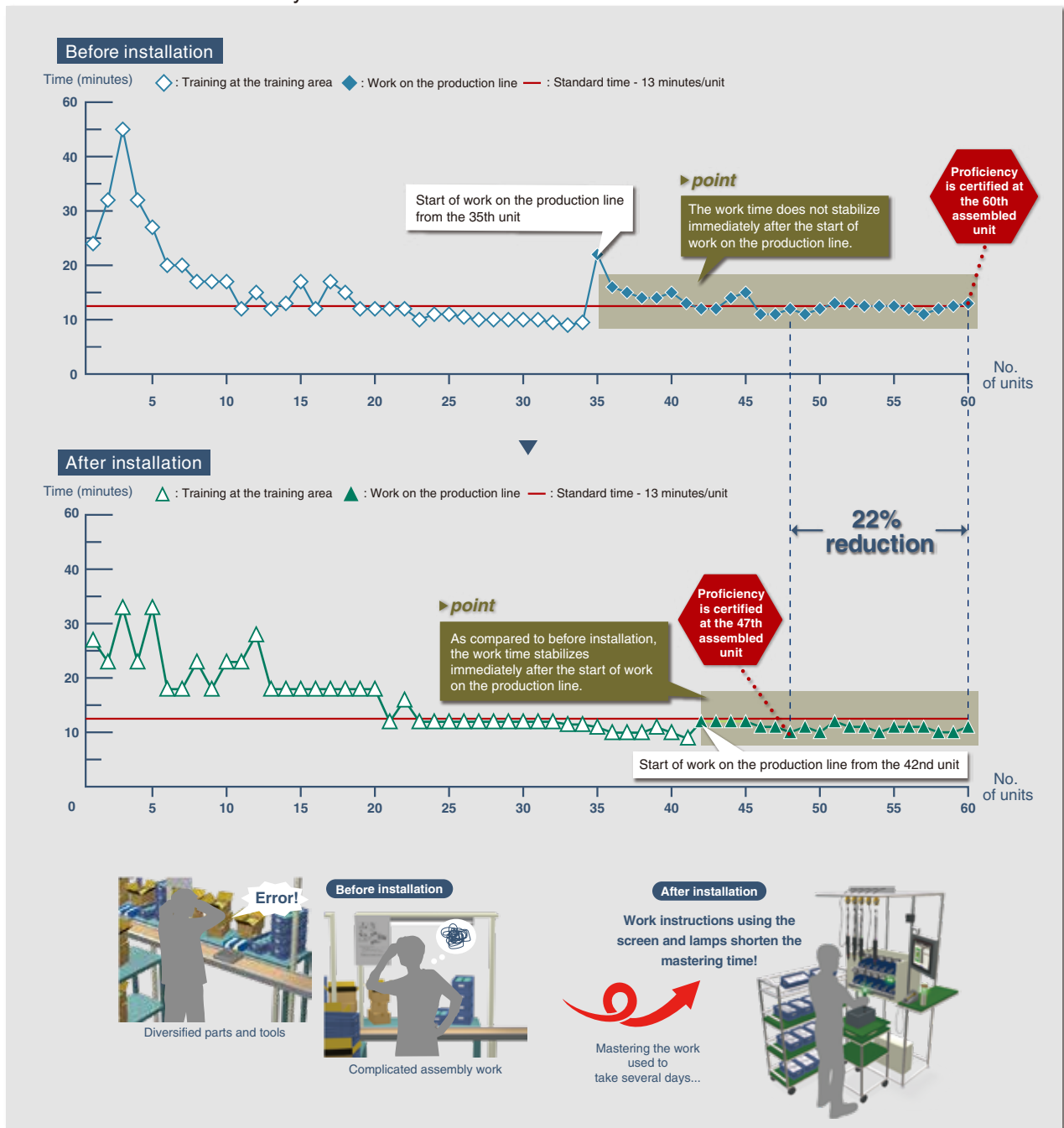
3 Model switching time is **reduced by 18%**

4 Assembly time is **reduced by 12%**

➡ These reductions lead to **an increase by 30% in production efficiency**!

This is an example based on the measurement results at the cell production site (assembly process) of Mitsubishi Electric. The effect may vary depending on the usage environment or the judgment criteria of work.

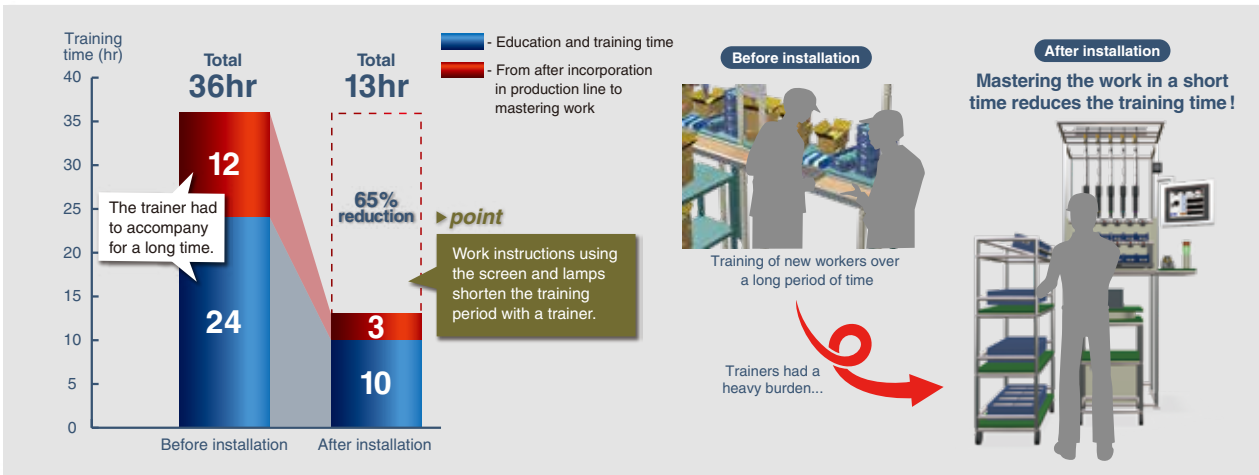**Issue 1**   ## Training new workers takes time

Effect ▶▶ The number of assembled units from the start of training until mastering the work is reduced by **22%**

Before installation

Time (minutes)   ◇ : Training at the training area   ◆ : Work on the production line   — : Standard time - 13 minutes/unit

Start of work on the production line from the 35th unit

▶*point*
The work time does not stabilize immediately after the start of work on the production line.

Proficiency is certified at the 60th assembled unit

No. of units

After installation

Time (minutes)   △ : Training at the training area   ▲ : Work on the production line   — : Standard time - 13 minutes/unit

22% reduction

▶*point*
As compared to before installation, the work time stabilizes immediately after the start of work on the production line.

Proficiency is certified at the 47th assembled unit

Start of work on the production line from the 42nd unit

No. of units

Error!

Diversified parts and tools

Before installation

Complicated assembly work

After installation

Work instructions using the screen and lamps shorten the mastering time!

Mastering the work used to take several days...

Issue 2
Training of new workers puts a heavy burden on trainers

Effect ▶▶ The training time is reduced by **65%**

Training time (hr)

Total **36hr**
Total **13hr**

- Education and training time
- From after incorporation in production line to mastering work

40
35
30
25
20
15
10
5
0

12
24

The trainer had to accompany for a long time.

65% reduction

▶*point*

Work instructions using the screen and lamps shorten the training period with a trainer.

3
10

Before installation | After installation

Before installation

Training of new workers over a long period of time

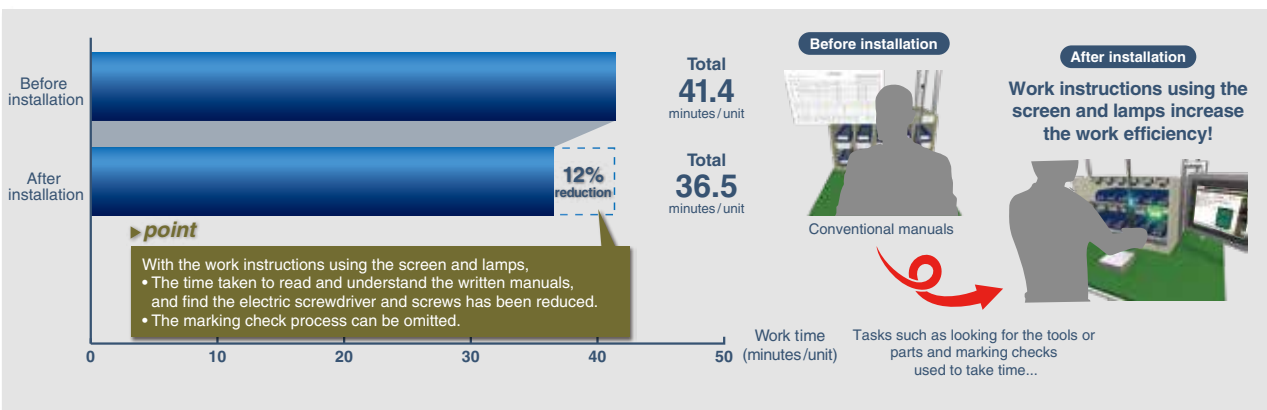Trainers had a heavy burden...

After installation

Mastering the work in a short time reduces the training time !

Issue 3
Setup time is long

Effect ▶▶ Model switching time is reduced by **18%**

- Parts trolley replacement
- Production tool adjustment
- Arrangement of procedures
- Barcode reading
- Kitting

It was necessary to prepare only the required parts and screws in order to prevent incorrect assembly.

Before installation | **59** | **17 18** | **358** | Total **452s**

After installation | **54** | **289** | **18% reduction** | Total **371s**

16 12

▶*point*

Work instructions using the screen and lamps can prevent incorrect assembly without preparation.

0 100 200 300 400 500 (s)
Time (s)

Before installation

Preparation of the required parts and screws

Preparation used to take time since incorrect assembly had to be prevented...

After installation

Work instructions using the screen and lamps help saving the preparation time!

Issue 4
The assembly work takes time

Effect ▶▶ The assembly work time is reduced by **12%**

Before installation

After installation | **12% reduction**

Total **41.4** minutes / unit

Total **36.5** minutes / unit

▶*point*

With the work instructions using the screen and lamps,
• The time taken to read and understand the written manuals, and find the electric screwdriver and screws has been reduced.
• The marking check process can be omitted.

0 10 20 30 40 50
Work time (minutes / unit)

Before installation

Conventional manuals

Tasks such as looking for the tools or parts and marking checks used to take time...

After installation

Work instructions using the screen and lamps increase the work efficiency!

Product Contents

This product is composed of software and documents. It is necessary to prepare hardware and engineering software separately.

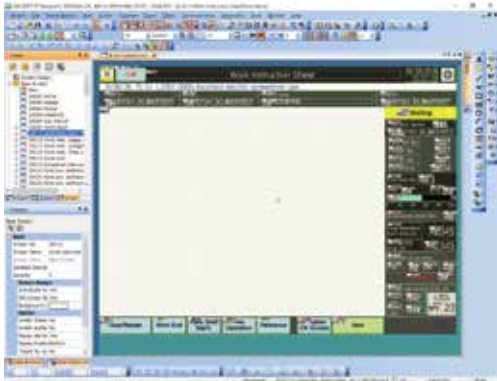For details, refer to "Necessary Software & Device List (P.19)".

Software

Screen data (GT Designer3 project file[1])
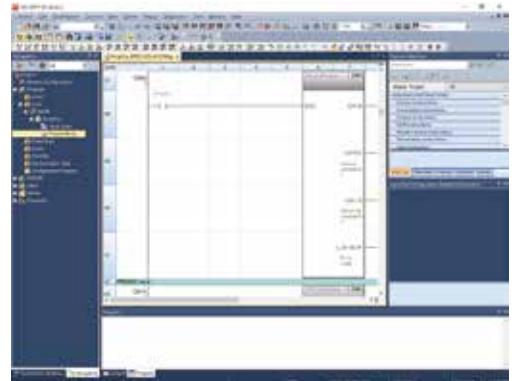
*1: MELSOFT GT Designer3 is required.

Screen data for displaying the work instruction sheet

Control program (GX Works2 project file[2])

*2: MELSOFT GX Works2 is required.

FBs for each function.

SWN Data Configurator

A tool for creating work recipe data and image files for the work instruction sheet[3].

*3: It is necessary to create definition files beforehand.

PLC-DB Transfer[4]

*4: MELSOFT MX Component Ver. 4 is required.

A tool for accumulating the work records acquired from the PLC CPU in the database.

Analysis template files

Template files for visualizing the work records accumulated in the database with the BI tool (SQL Server Reporting Services).

Documents

Manuals (PDF files)

• Startup Manual
• Operating Manual

Connectable Devices

Smart Work Navigator can be connected with various devices.

Devices can be selected according to the usage or scale of the system to be constructed.

PLC (MELSEC iQ-F series)

Display device

GOT

General purpose display (SoftGOT)

POKAYOKE terminal

• Pushbutton type
• Door open/close type
• Transmission type
• Touch type

Electric screwdriver

• AnyWireASLINK-compatible type
• External I/O signal type

Electric screwdriver with built-in torque sensor[1]

Built-in torque sensor type

*1: Only one electric screwdriver with built-in torque sensor can be used in the Smart Work Navigator system.

General purpose devices

Barcode reader

Signal tower
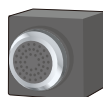
Buzzer

Switch

Lamp

Torque checker

Application example

Each production site faces various problems.

System construction depending on the situation and purpose is achieved by selecting devices according to the usage or scale, and it helps solving problems on production sites.
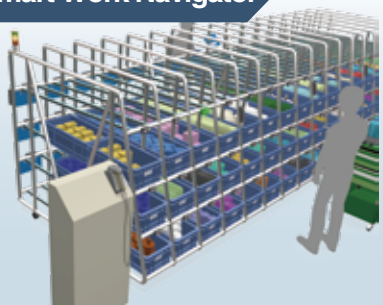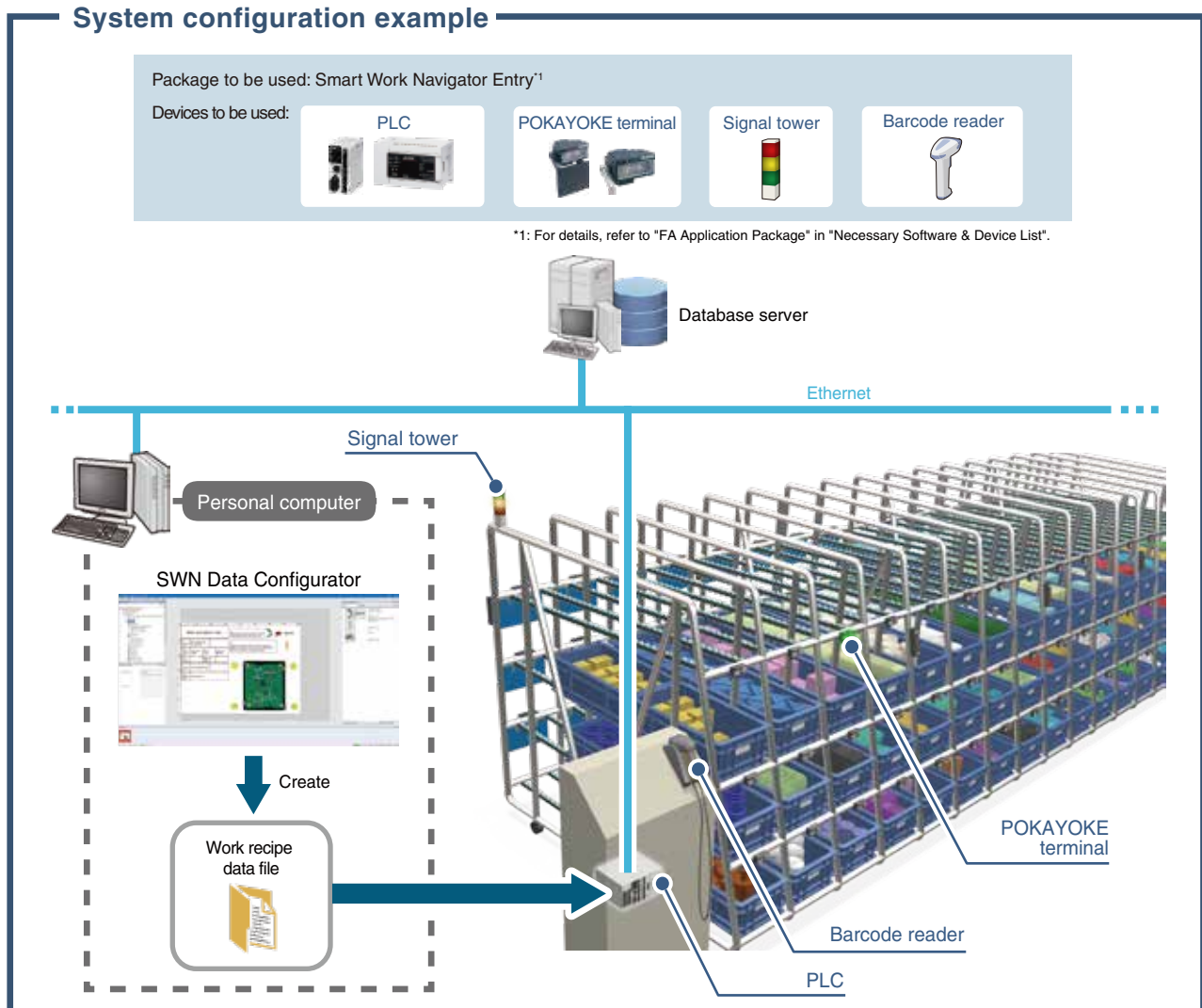
Case 1   Picking work

Before installation

- Finding parts takes time
- Wrong parts pickup/supply should be eliminated

After installation of Smart Work Navigator

1) Lamps indicate which parts should be picked up
2) An alarm on the signal tower prevents stockout
3) Door-type shelves prevents wrong parts supply

System configuration example

Package to be used: Smart Work Navigator Entry[1]

Devices to be used:

| PLC | POKAYOKE terminal | Signal tower | Barcode reader |

*1: For details, refer to "FA Application Package" in "Necessary Software & Device List".

Database server

Ethernet

Signal tower

Personal computer

SWN Data Configurator

Create

Work recipe data file

POKAYOKE terminal

Barcode reader

PLC

Case 2 Assembly work

Before installation

- Work efficiency is poor due to procedure check and parts selection
- Mistakes are repeated

After installation of Smart Work Navigator

1) Lamps indicate which parts should be used
2) Work procedure is displayed on the screen
3) Work progress can be checked on the screen

System configuration example
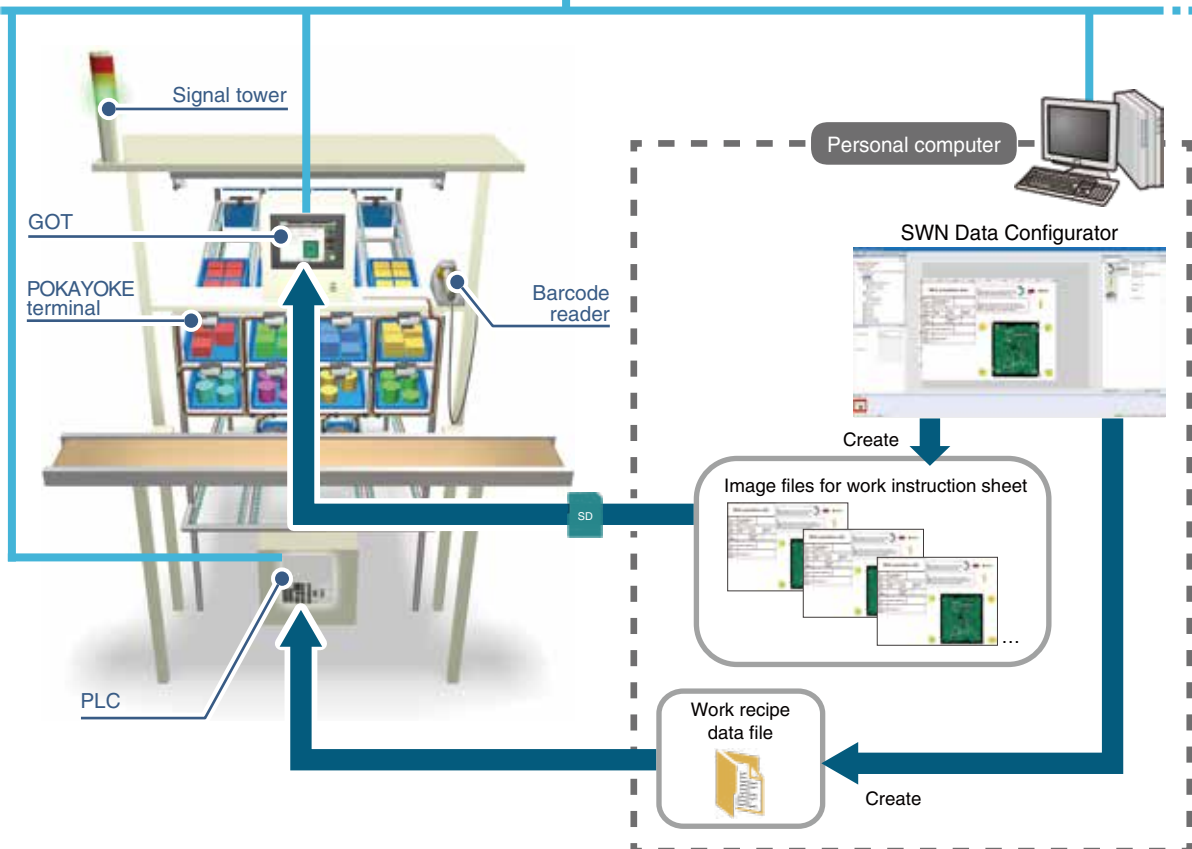
Package to be used: Smart Work Navigator Standard[*2]

Devices to be used:
PLC	GOT	POKAYOKE terminal	Signal tower	Barcode reader

*2: For details, refer to "FA Application Package" in "Necessary Software & Device List".

Database server

Ethernet

Signal tower

Personal computer

GOT

SWN Data Configurator

POKAYOKE terminal

Barcode reader

Create

SD

Image files for work instruction sheet

...

PLC

Work recipe data file

Create

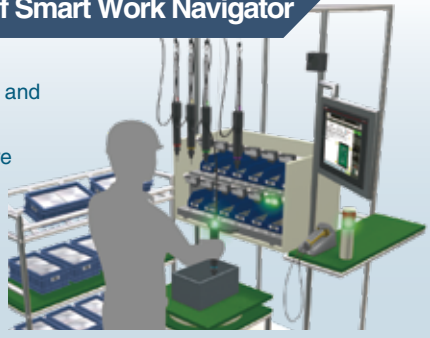## Case 3   Screw tightening work

Before installation

■ Inexperienced workers need time to complete many work processes

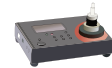**After installation of Smart Work Navigator**

1) Lamps indicate which part and tool should be used

2) Screw tightening procedure is displayed on the screen
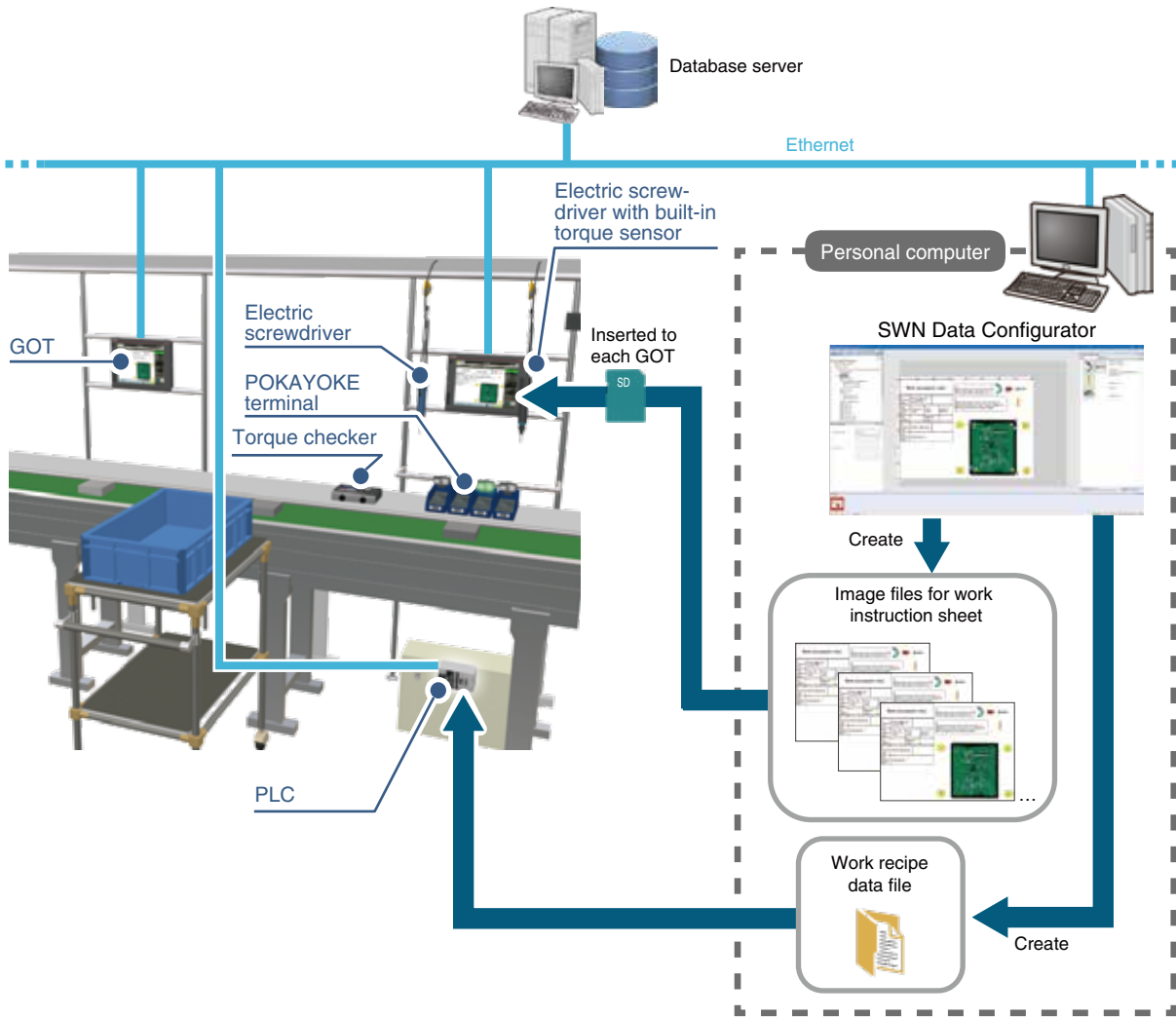

System configuration example

Package to be used: Smart Work Navigator Standard*3

Devices to be used:

PLC	GOT	POKAYOKE terminal	Electric screwdriver	Electric screwdriver with built-in torque sensor	Torque checker

*3: For details, refer to "FA Application Package" in "Necessary Software & Device List".

Database server

Ethernet

Electric screwdriver with built-in torque sensor

Electric screwdriver

GOT

POKAYOKE terminal

Torque checker

Inserted to each GOT

SD

PLC

Personal computer

SWN Data Configurator

Create

Image files for work instruction sheet

...

Work recipe data file

Create

Case 4 | Checking the detailed work on the large screen

Before installation

■ It is difficult to check the small parts or detailed installation position on paper or the small screen

After installation of Smart Work Navigator

1) General purpose display is available as a large screen display
2) Lamps indicate which part and tool should be used
3) Screw tightening procedure is displayed on the screen

System configuration example

Package to be used: Smart Work Navigator Standard*4

Devices to be used:

| PLC | General purpose display (SoftGOT) | POKAYOKE terminal | Electric screwdriver | Signal tower |

*4: For details, refer to "FA Application Package" in "Necessary Software & Device List".

Database server

Ethernet

Displaying SoftGOT on the general purpose liquid crystal display

PLC

POKAYOKE terminal

Signal tower

Electric screwdriver

Personal computer

Image files for work instruction sheet

Work recipe data file

Create

SWN Data Configurator

Create
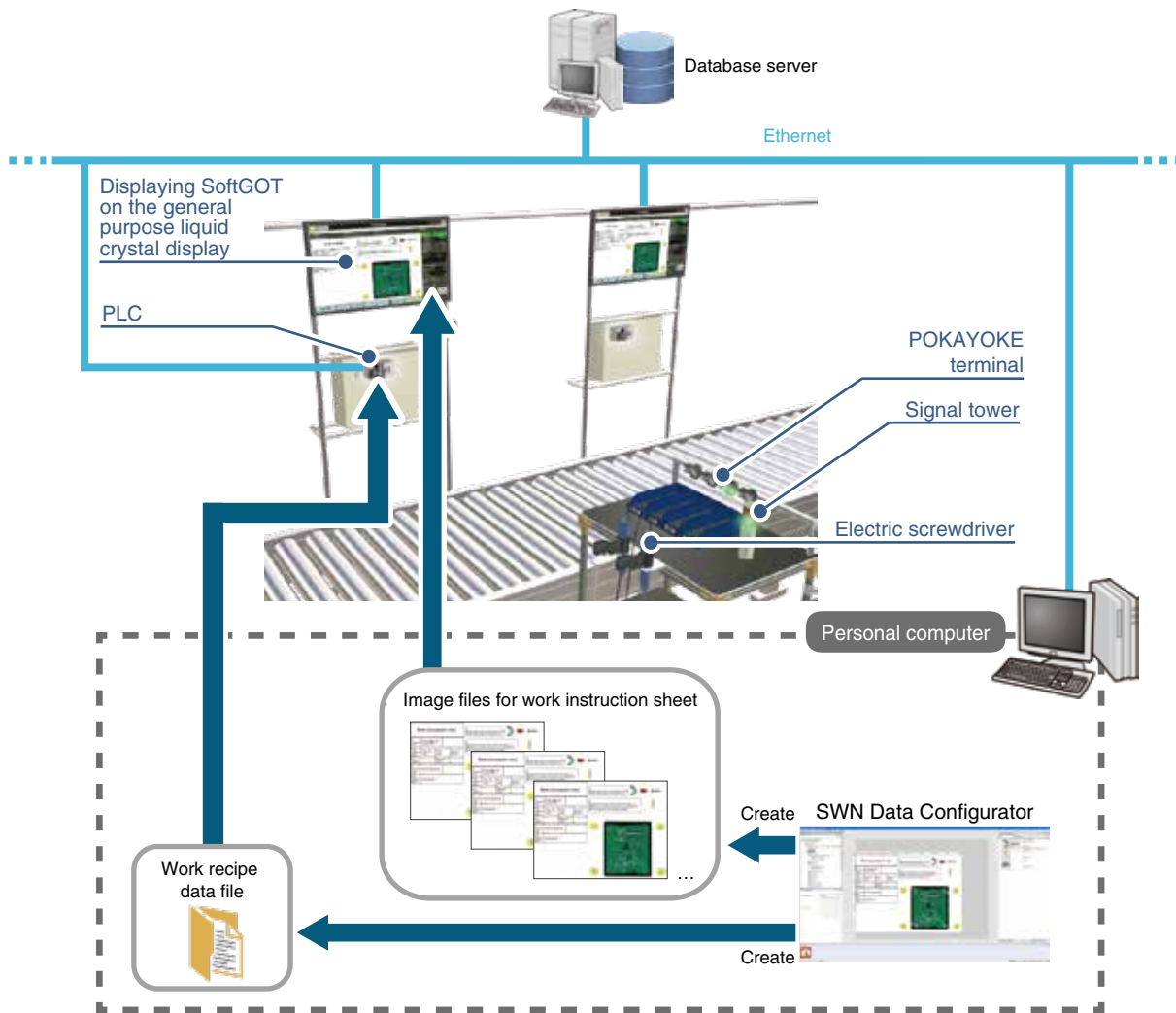
Necessary Software & Device List

FA Application Package

Product name	Manufacturer	Model	Work instruction method	Number of licenses[1]	Price
FA application package iQ Monozukuri Smart Work Navigator Entry	Mitsubishi Electric Corporation	AP10-SWN001AA-MA	Lamp only	1	Open price
		AP10-SWN001AA-MB		5	
		AP10-SWN001AA-MC		10	
		AP10-SWN001AA-MD		15	
		AP10-SWN001AA-ME		20	
		AP10-SWN001AA-MF		25	
FA application package iQ Monozukuri Smart Work Navigator Standard	Mitsubishi Electric Corporation	AP10-SWN001BA-MA	Lamp/screen	1	Open price
		AP10-SWN001BA-MB		5	
		AP10-SWN001BA-MC		10	
		AP10-SWN001BA-MD		15	
		AP10-SWN001BA-ME		20	
		AP10-SWN001BA-MF		25	

*1: One license is required per system.

Software

Product name	Quantity	Manufacturer	Model	Remarks
GOT Screen Design Software MELSOFT GT Works3[*2]	1	Mitsubishi Electric Corporation	SW1DND-GTWK3-E	Version 1.210U or later
PLC Engineering Software MELSOFT GX Works3	1	Mitsubishi Electric Corporation	SW1DND-GXW3-E	Version 1.053F or later
Communication library MELSOFT MXComponent Ver.4[*3]	1	Mitsubishi Electric Corporation	SW4DNC-ACT-E	Version 4.16S or later
License key for GT SoftGOT2000[*4]	1	Mitsubishi Electric Corporation	GT27-SGTKEY-U	GT SoftGOT2000 Version 1.210U or later for USB port
Microsoft® Excel®	1	Microsoft Corporation	Microsoft® Excel® 32-bit version	2013 or later
Microsoft® SQL Server®[*3]	1	Microsoft Corporation	Microsoft® SQL Server® Microsoft® SQL Server® Express Edition	2012 or later

*2: MELSOFT GT Designer3 and GT SoftGOT2000 are included in MELSOFT GT Works3.
*3: It is required when the work record data is collected in the database.
*4: It is required when GT SoftGOT2000 is used.

Device[*5]

Device name	Quantity[*6]	Manufacturer	Model	Remarks
CPU module	1	Mitsubishi Electric Corporation	FX5U-32MR/ES	Any of the models on the left (Use the product with the firmware version "1.060" or later.)
			FX5U-32MT/ES	
			FX5U-32MT/ESS	
			FX5U-64MR/ES	
			FX5U-64MT/ES	
			FX5U-64MT/ESS	
			FX5U-80MR/ES	
			FX5U-80MT/ES	
			FX5U-80MT/ESS	
			FX5U-32MR/DS	
			FX5U-32MT/DS	
			FX5U-32MT/DSS	
			FX5U-64MR/DS	
			FX5U-64MT/DS	
			FX5U-64MT/DSS	
			FX5U-80MR/DS	
			FX5U-80MT/DS	
			FX5U-80MT/DSS	
			FX5UC-32MT/D	
			FX5UC-32MT/DSS	
			FX5UC-64MT/D	
			FX5UC-64MT/DSS	
			FX5UC-96MT/D	

Device name	Quantity[*6]	Manufacturer	Model	Remarks	
CPU module	1	Mitsubishi Electric Corporation	FX5UC-96MT/DSS	Any of the models on the left (Use the product with the firmware version "1.060" or later.)	
			FX5UC-32MT/DS-TS		
			FX5UC-32MT/DSS-TS		
Battery	1	Mitsubishi Electric Corporation	FX3U-32BL	For CPU module	
AnyWireASLINK system master module	1	Mitsubishi Electric Corporation	FX5-ASL-M	-	
GOT	1	Mitsubishi Electric Corporation	GT2715-XTBA/D	Screen size: 15 inch XGA	Any of the models on the left
			GT2712-STBA/D	Screen size: 12.1-inch SVGA	
			GT2512-STBA/D	Screen size: 12.1-inch SVGA	
			GT2510-WXTBD/SD	Screen size: 10.1-inch WXGA	
SD memory card	1	Mitsubishi Electric Corporation	NZ1MEM-2GBSD	SD memory card 2 GB	Any of the models on the left
			NZ1MEM-4GBSD	SDHC memory card 4 GB	
			NZ1MEM-8GBSD	SDHC memory card 8 GB	
			NZ1MEM-16GBSD	SDHC memory card 16 GB	
Barcode reader	1	DENSO WAVE INCORPORATED	AT26Q-SM(R)	Any of the models on the left	
			AT21Q-SM(R)		
			AT25Q-SM(R)		
			AT20Q-SM(R)		
		Cognex Corporation	DMR-8050-0100		
OK buzzer	1	Optional	-	-	
NG buzzer	1	Optional	-	-	
Signal tower	1	Optional	-	Two-color light (for notification of screw tightening OK/NG judgment), three-color light (for operation status notification)	

*5: For other supported devices, contact your local Mitsubishi Electric representative.
*6: Necessary quantity per system.

Optional[*7]

Device name	Quantity	Manufacturer	Model	Description	Remarks
POKAYOKE terminal	Optional	Anywire Corporation	BL227XB-K02V-P	Standard compact, LED indication (selection type), Lever switch type	ASLINK POKAYOKE series
			BL227XB-K06M-P	Standard compact, LED indication (combination type), Lever switch type	
			BL227XB-K02VN-P	Standard compact, LED indication (selection type), Pushbutton switch type	
			BL227XB-K06MN-P	Standard compact, LED indication (combination type), Pushbutton switch type	
			BL227XB-K02VL-P	Standard compact, LED indication (selection type), Photoelectric downward reflection	
			BL227XB-K06ML-P	Standard compact, LED indication (combination type), Photoelectric downward reflection	
			BL227PB-T07P02V-P (light emission)	70mm, LED indication (selection type), Photoelectric transmission	
			BL227XB-T07P02V-C (light reception)		
			BL227PB-T07P06M-P (light emission)	70mm, LED indication (combination type), Photoelectric transmission	
			BL227XB-T07P06M-C (light reception)		
			BL227PB-T14P02V-P (light emission)	140mm, LED indication (selection type), Photoelectric transmission	
			BL227XB-T14P02V-C (light reception)		
			BL227PB-T14P06M-P (light emission)	140mm, LED indication (combination type), Photoelectric transmission	
			BL227XB-T14P06M-C (light reception)		
			BL227XB-F2K04V-P	Standard compact, Door, Metal arm vertical/Independent + LED indication (selection type), Lever switch type	
			BL227XB-F2K08M-P	Standard compact, Door, Metal arm vertical/Independent + LED indication (combination type), Lever switch type	
			BL227XB-F2K04VN-P	Standard compact, Door, Metal arm vertical/Independent + LED indication (selection type), Pushbutton switch type	
			BL227XB-F2K08MN-P	Standard compact, Door, Metal arm vertical/Independent + LED indication (combination type), Pushbutton switch type	
			BL227XB-F2K04VL-P	Standard compact, Door, Metal arm vertical/Independent + LED indication (selection type), Photoelectric downward reflection	
			BL227XB-F2K08ML-P	Standard compact, Door, Metal arm vertical/Independent + LED indication (combination type), Photoelectric downward reflection	
			BL227XB-R2K04V-P	Standard compact, Door, Metal arm horizontal/Independent + LED indication (selection type), Lever switch type	
			BL227XB-R2K08M-P	Standard compact, Door, Metal arm horizontal/Independent + LED indication (combination type), Lever switch type	
			BL227XB-R2K04VN-P	Standard compact, Door, Metal arm horizontal/Independent + LED indication (selection type), Pushbutton switch type	
			BL227XB-R2K08MN-P	Standard compact, Door, Metal arm horizontal/Independent + LED indication (combination type), Pushbutton switch type	
			BL227XB-R2K04VL-P	Standard compact, Door, Metal arm horizontal/Independent + LED indication (selection type), Photoelectric downward reflection	
			BL227XB-R2K08ML-P	Standard compact, Door, Metal arm horizontal/Independent + LED indication (combination type), Photoelectric downward reflection	
			BL227XB-F3K04V-P	Standard compact, Door, Plastic arm vertical/Independent + LED indication (selection type), Lever switch type	
			BL227XB-F3K08M-P	Standard compact, Door, Plastic arm vertical/Independent + LED indication (combination type), Lever switch type	
			BL227XB-F3K04VN-P	Standard compact, Door, Plastic arm vertical/Independent + LED indication (selection type), Pushbutton switch type	
			BL227XB-F3K08MN-P	Standard compact, Door, Plastic arm vertical/Independent + LED indication (combination type), Pushbutton switch type	
			BL227XB-F3K04VL-P	Standard compact, Door, Plastic arm vertical/Independent + LED indication (selection type), Photoelectric downward reflection	

Product List

Device name	Quantity	Manufacturer	Model	Description	Remarks
POKAYOKE terminal	Optional	Anywire Corporation	BL227XB-F3K08ML-P	Standard compact, Door, Plastic arm vertical/Independent + LED indication (combination type), Photoelectric downward reflection	ASLINK POKAYOKE series
			BL227XB-F04V-P	Standard, Door, Metal arm vertical/Independent + LED indication (selection type), Lever switch type	
			BL227XB-F04VL-P	Standard, Door, Metal arm vertical/Independent + LED indication (selection type), Photoelectric downward reflection	
			B292XB-02VL	Wire duct type, LED indication (selection type), Touch type	
			B292XB-06ML	Wire duct type, LED indication (combination type), Touch type	
			BL2101XB-02VL-P	Surface-emittion type, LED indication (selection type), Touch type	
			BL227XB-K71V-P	Standard compact, 7-segment (one digit) + LED indication (selection type), Lever switch type	
			BL227XB-K71VN-P	Standard compact, 7-segment (one digit) + LED indication (selection type), Pushbutton switch type	
			BL227XB-K71VL-P	Standard compact, 7-segment (one digit) + LED indication (selection type), Photoelectric downward reflection	
			BL227XB-K71M-P	Standard compact, 7-segment (one digit) + LED indication (combination type), Lever switch type	
			BL227XB-K71MN-P	Standard compact, 7-segment (one digit) + LED indication (combination type), Pushbutton switch type	
			BL227XB-K71ML-P	Standard compact, 7-segment (one digit) + LED indication (combination type), Photoelectric downward reflection	
			BL227XB-K72V-P	Standard compact, 7-segment (two digit) + LED indication (selection type), Lever switch type	
			BL227XB-K72VN-P	Standard compact, 7-segment (two digit) + LED indication (selection type), Pushbutton switch type	
			BL227XB-K72VL-P	Standard compact, 7-segment (two digit) + LED indication (selection type), Photoelectric downward reflection	
			BL227XB-K72M-P	Standard compact, 7-segment (two digit) + LED indication (combination type), Lever switch type	
			BL227XB-K72MN-P	Standard compact, 7-segment (two digit) + LED indication (combination type), Pushbutton switch type	
			BL227XB-K72ML-P	Standard compact, 7-segment (two digit) + LED indication (combination type), Photoelectric downward reflection	
Electric screwdriver	Optional	NITTO KOHKI CO., LTD.	DLV30A06L-ASL (AA)	0.4 to 1.6 N•m, 650 rpm	Electric screwdriver interlocking with other FA devices (lever start)
				1.2 to 3.0 N•m, 650 rpm	
			DLV30A12L-ASL (AA)	0.4 to 1.6 N•m, 1200 rpm	
				1.2 to 3.0 N•m, 1200 rpm	
			DLV30A20L-ASL (AA)	0.4 to 1.6 N•m, 2000 rpm	
				1.2 to 3.0 N•m, 2000 rpm	
			DLV45A06L-ASL (AA)	2.0 to 4.5 N•m, 650 rpm	
			DLV45A12L-ASL (AA)	2.0 to 4.5 N•m, 1200 rpm	
			DLV70A06L-ASL (AA)	3.8 to 7.0 N•m, 650 rpm	
			DLV30A06P-ASL (AA)	0.4 to 1.6 N•m, 650 rpm	Electric screwdriver interlocking with other FA devices (push to start)
				1.2 to 3.0 N•m, 650 rpm	
			DLV30A12P-ASL (AA)	0.4 to 1.6 N•m, 1200 rpm	
				1.2 to 3.0 N•m, 1200 rpm	
			DLV30A20P-ASL (AA)	0.4 to 1.6 N•m, 2000 rpm	
				1.2 to 3.0 N•m, 2000 rpm	
			DLV45A06P-ASL (AA)	2.0 to 4.5 N•m, 650 rpm	
			DLV45A12P-ASL (AA)	2.0 to 4.5 N•m, 1200 rpm	
			DLV70A06P-ASL (AA)	3.8 to 7.0 N•m, 650 rpm	
			DLV30A06L-SPC (AA)	0.4 to 1.6 N•m, 650 rpm	Electric screwdrivers with screw tightening counter (lever start)
				1.2 to 3.0 N•m, 650 rpm	
			DLV30A12L-SPC (AA)	0.4 to 1.6 N•m, 1200 rpm	
				1.2 to 3.0 N•m, 1200 rpm	
			DLV30A20L-SPC (AA)	0.4 to 1.6 N•m, 2000 rpm	
				1.2 to 3.0 N•m, 2000 rpm	
			DLV45A06L-SPC (AA)	2.0 to 4.5 N•m, 650 rpm	
			DLV45A12L-SPC (AA)	2.0 to 4.5 N•m, 1200 rpm	
			DLV70A06L-SPC (AA)	3.8 to 7.0 N•m, 650 rpm	
			DLV30A06P-SPC (AA)	0.4 to 1.6 N•m, 650 rpm	Electric screwdrivers with screw tightening counter (push to start)
				1.2 to 3.0 N•m, 650 rpm	
			DLV30A12P-SPC (AA)	0.4 to 1.6 N•m, 1200 rpm	
				1.2 to 3.0 N•m, 1200 rpm	
			DLV30A20P-SPC (AA)	0.4 to 1.6 N•m, 2000 rpm	
				1.2 to 3.0 N•m, 2000 rpm	
			DLV45A06P-SPC (AA)	2.0 to 4.5 N•m, 650 rpm	
			DLV45A12P-SPC (AA)	2.0 to 4.5 N•m, 1200 rpm	
			DLV70A06P-SPC (AA)	3.8 to 7.0 N•m, 650 rpm	

Device name	Quantity	Manufacturer	Model	Description	Remarks
Electric screwdriver with built-in torque sensor[8]	Optional	HIOS Inc.	PG-3000	0.2 to 0.55 N•m, 980/680 rpm	Electric screwdriver with built-in torque sensor (Lever start)
			PG-5000	0.4 to 1.2 N•m, 900/590 rpm	
			PG-7000	1.0 to 2.8 N•m, 960/630 rpm	
			T-70BL	-	Power supply for driver
			PG-01	-	Control module (Judgment device)
Torque checker	Optional	NITTO KOHKI CO., LTD.	DLT1633A	-	Torque checker
		Mitutoyo Corporation	IT-007R	-	Input tool
			905338	-	SPC connection cable (1m)
			905409	-	SPC connection cable (2m)

*7: For other supported devices, contact your local Mitsubishi Electric representative.

*8: Only one electric screwdriver with built-in torque sensor can be used in the Smart Work Navigator system.

Specifications

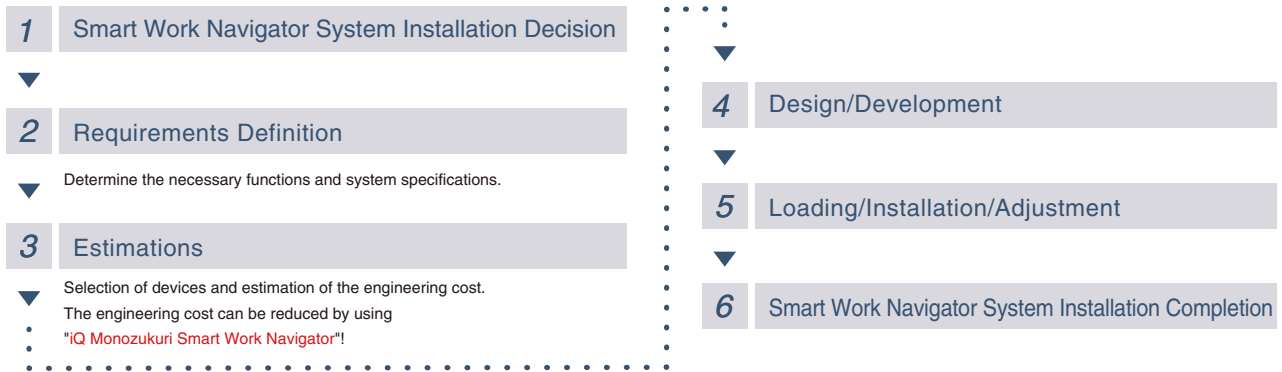## Operating environment of personal computer for tool

Item	Description	Remarks
Operation guaranteed OS	Microsoft® Windows® 10 (Home, Pro, Enterprise)	-
	Microsoft® Windows® 7 (Professional, Ultimate, Enterprise)	-
CPU	64-bit OS: 2 GHz or more / 32-bit OS: 2 GHz or more (Intel core i3 or higher processor is recommended.)	-
Memory	64-bit OS: 2 GB or more / 32-bit OS: 2 GB or more	-
Free disk space	64-bit OS: 20 GB or more / 32-bit OS: 20 GB or more	-
Disk drive	DVD drive	Installation DVD-ROM
Interface	SD memory card slot (for SDHC)	For data read/write between the personal computer and GOT
Application	MELSOFT GX Works3	For setting control program
	MELSOFT GT Designer3 (GOT2000)	For setting GOT screen data
	Microsoft® Excel®	For SWN Definition File Generator operation
	Microsoft® .NET Framework 3.5	For SWN Data Configurator operation

Operating environment of personal computer for database server

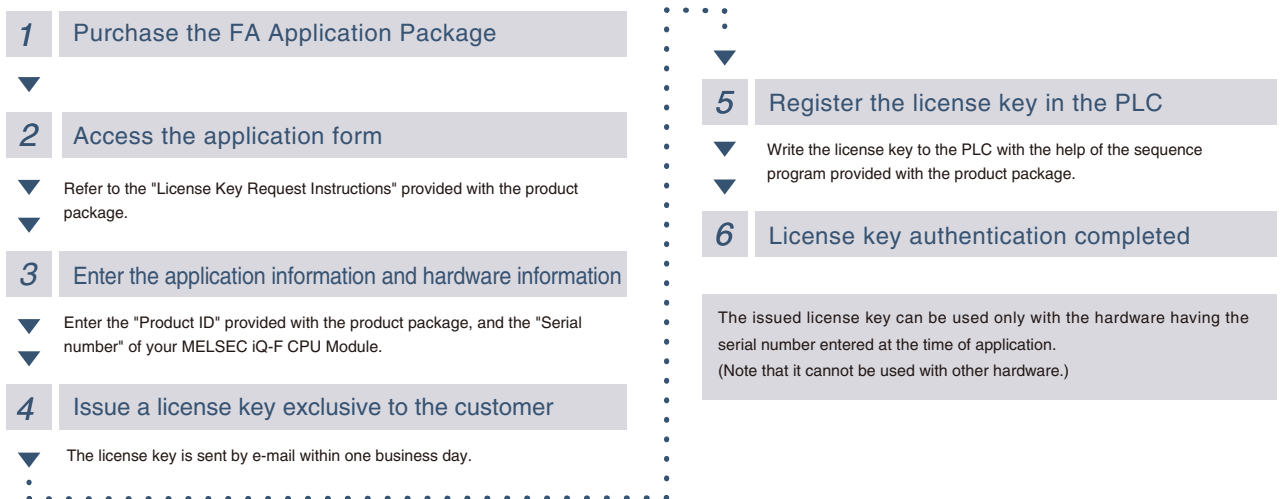| Item	Description	Remarks
Operation guaranteed OS	Microsoft® Windows® 10 (Pro, Enterprise)	-
	Microsoft® Windows® 7 (Professional, Ultimate, Enterprise)	-
CPU	64-bit OS: 2 GHz or more / 32-bit OS: 2 GHz or more	-
Memory	64-bit OS: 4 GB or more / 32-bit OS: 4 GB or more	-
Free disk space	64-bit OS: 20 GB or more / 32-bit OS: 16 GB or more	-
Disk drive	DVD drive	Installation DVD-ROM
Web browser	Microsoft® Internet Explorer® 11 or later	For displaying SWN Analysis templates (resolution 1920 x 1080)
Database management system	Microsoft® SQL Server®	-
Application	Microsoft® .NET Framework 4.6	For database management system operation
	Microsoft® Excel®	For SWN DB Configuration File Generator operation
	MX Component	For communication between the personal computer and PLC

Procedure for installing the system

The procedure for installing the system is as shown below.
If it is difficult for the customer to construct the system, we will introduce a system integrator.

1   Smart Work Navigator System Installation Decision

▼

2   Requirements Definition

▼   Determine the necessary functions and system specifications.

3   Estimations

▼   Selection of devices and estimation of the engineering cost.
The engineering cost can be reduced by using
"iQ Monozukuri Smart Work Navigator"!

▼

4   Design/Development

▼

5   Loading/Installation/Adjustment

▼

6   Smart Work Navigator System Installation Completion

FA Application Package Procedure of license key authentication

To use the FA application package "iQ Monozukuri Smart Work Navigator", authenticating a license key is required.
The procedure of obtaining and authenticating the license key is as follows:

1   Purchase the FA Application Package

▼

2   Access the application form

▼   Refer to the "License Key Request Instructions" provided with the product package.

▼

3   Enter the application information and hardware information

▼   Enter the "Product ID" provided with the product package, and the "Serial number" of your MELSEC iQ-F CPU Module.

▼

4   Issue a license key exclusive to the customer

▼   The license key is sent by e-mail within one business day.

5   Register the license key in the PLC

▼   Write the license key to the PLC with the help of the sequence program provided with the product package.

▼

6   License key authentication completed

The issued license key can be used only with the hardware having the serial number entered at the time of application.
(Note that it cannot be used with other hardware.)

iQ Monozukuri — FA Application Package Lineup

Processes and Usages

Packages in line with the status and purposes such as where to use or with what intention

Process Remote Monitoring

Visualizing operation status and introducing IoT technologies to the shop floor to improve manufacturing process and productivity.

ANDON

ANDON display improves productivity by sharing information between workers.

Smart Work Navigator

Systems for supporting picking and assembly work can be easily developed and operated.

Rotary Machine Vibration Diagnosis

Predictive maintenance can be realized for the facilities with rotary machines.

Tool Wear Diagnosis for Machine Tools

Tool wear conditions are tracked by using IoT data to help optimize tool operation and improve processing quality.

Processing Machine Loading

The setup and development of a processing machine loading/unloading system is supported.

Force-sense Application

Various force sensing operations such as assembly, fitting, and inspection have been automated.

Deburring/Polishing

Deburring and polishing can be automated just by rough teaching.

Equipment

Packages realizing shortening of the system development time and easy development
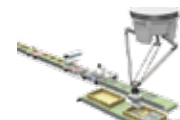
CONVERTING

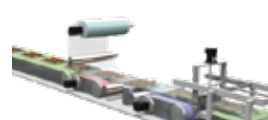The development of a converting system that requires unwinding and winding control is supported.

HANDLING

The development of a convey-ance mechanism that requires the calculation of coordinate conversion is supported.

PACKAGING

The development of a packaging machine that requires cam control and position correction is supported.

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In some cases, trademark symbols such as '™' or '®' are not specified in the text.

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