Factory Automation Systems
Business Strategy Briefing
~ Overview of FA Systems Business and Growth Strategy ~

Yoshikazu Miyata
Executive Officer and Group President
Factory Automation Systems

March 27, 2018
Mitsubishi Electric Corporation
# Table of Contents

1. Business Overview

2. Growth Strategy
   - e-F@ctory
   - AI Utilization
   - Product Strategy
   - Regional Strategy

3. Mid-term Business Target
1. Business Overview: Positioning within the Company

One of the Growth-driving Businesses

Energy & Electric Systems
- Power Systems
- Transportation Systems
- Building Systems
- Public systems

Industrial Automation Systems
- Factory Automation (FA) Systems
- Automotive Equipment

Information & Communication Systems
- Space Systems
- Defense Systems
- Communications Systems
- Video Monitoring Systems
- IT Solutions

Electronic Devices
- Power Devices
- High Frequency and Optical Devices
- TFT-LCD Modules

Home Appliances
- Air-conditioning & Refrigeration Systems
- Housing Equipment
- Kitchen and Other Household Appliances
1. Business Overview: Product Portfolio

Comprehensive FA Manufacturer Offering a Wide Range of Products, Services and Solutions

<table>
<thead>
<tr>
<th>Controllers</th>
<th>Programmable Controllers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>HMIs*1</td>
</tr>
<tr>
<td>Drive Control Devices</td>
<td>AC Servos</td>
</tr>
<tr>
<td></td>
<td>Inverters</td>
</tr>
<tr>
<td></td>
<td>CNCs*2</td>
</tr>
<tr>
<td>Mechatronics Products</td>
<td>Electrical-discharge Machines</td>
</tr>
<tr>
<td></td>
<td>Laser-processing Machines</td>
</tr>
<tr>
<td></td>
<td>Robots</td>
</tr>
<tr>
<td>Rotating Devices</td>
<td>Three-phase Motors, Geared Motors, Industrial Fans</td>
</tr>
<tr>
<td>Power Distribution Controllers</td>
<td>Circuit Breakers, Energy-saving Devices, Electromagnetic Switchgear, Transformers</td>
</tr>
</tbody>
</table>

*1 HMIs: Human–Machine Interfaces  *2 CNCs: Computerized Numerical Controllers
1. Business Overview: Advantages of Products

Creating Value by Utilizing Technological Assets

**Technological Assets**
- Control (motion, heat, fluid, electric power)
- Power electronics
- HMIs
- Communications
- Electromagnetic analysis
- Devices
- Encryption
- Information processing
- Sensing
- Design
- ...

**Controllers/Drive Control Devices/Rotating Devices/Power Distribution Controllers**

**Mechatronics Products**

- In-house development/manufacturing of key parts
  - Power modules
  - Laser oscillators
  - Encoders
  - ASICs
  - Speed reducers
  - ...

Incorporated into systems
1. Business Overview: Where Our Products Are Used (1)

Contributing to Improving Customer Product Competitiveness, and Facilitating Automation and Adoption of IoT*1 at Production Sites

- Liquid-crystal/Organic EL
- Smartphones
- Semiconductors
- Automobiles/Automotive Components

*1 Internet of Things
1. Business Overview: Where Our Products Are Used (2)

Widely Used Outside of Production Sites as Well

Logistics/Transportation

Power Distribution Facilities

Building Air-conditioning

Waste Processing Plants

Tunnel Excavation/Ventilation

Ports & Harbors/Shipping

<Production Volume of Major Products>

AC Servos 370,000 units/month

Programmable Controllers (CPUs) 150,000 units/month

Inverters 200,000 units/month
1. Business Overview: Trend in Consolidated Sales

New Record Sales Expected Thanks to Strong Capex Demand

(JPY Billion)

*Other Asian regions: India, ASEAN Countries, Oceania, etc.

- Europe and US
- Other Asian regions*
- China, South Korea, Taiwan
- Japan

- Overseas ratio
  - FY12: 35%
  - FY13: 42%
  - FY14: 47%
  - FY15: 47%
  - FY16: 49%
  - FY17: 52%

Forecast

- Accelerated shift towards automation and IoT
- Cultivation of new fields/markets
- Increased market share
Sales Expanded in All Regions, Driven by China, South Korea and Taiwan

(JPY Billion)

450

4. Business Overview: FY17/Q3 Consolidated Sales

Apr–Dec/16

Apr–Dec/17

Japan

China, South Korea, Taiwan

Other Asian regions

Europe and US

123% year-on-year
Sales Expanded in All Product Categories, Driven by Drive Control Devices

1. Business Overview: FY17/Q3 Consolidated Sales

- Mechatronics Products
- Rotating Devices
- Power Distribution Controllers

Controllers
Drive Control Devices

123% year-on-year

Apr-Dec/16
Apr-Dec/17

(JPY Billion)
1. Business Overview: Trend in Quarterly Consolidated Sales

Maintained at High Levels, Mainly for Smartphones, LCDs/OLEDs, Semiconductors and Automotive Components

Consolidated Sales

Index (Apr-Jun/16 = 100)


100 111 113 126 130 134 134

* Index (Apr-Jun/16 = 100)
1. Business Overview: Production Network

Production in Overseas Consumption Areas Expands as Well as in Japan

- Mitsubishi Electric Low-Voltage Equipment (Xiamen) Co., Ltd.
- Mitsubishi Electric Automation Manufacturing (Changshu) Co., Ltd.
- Mitsubishi Electric Dalian Industrial Products Co., Ltd.
- Mitsubishi Electric India Pvt. Ltd.
- Mitsubishi Electric Automation (Thailand) Co., Ltd.
- Oriental Electric Industry Co., Vietnam Ltd.

- Second factory became operational (Mar 17)
- Second factory to be expanded (Oct 18)
1. Business Overview: R&D Network

Maximizing Comprehensive Strengths and Overseas Hubs

Corporate Research and Development Group’s Research Centers

- Information Technology R&D Center (Kamakura City)
- Industrial Design Center (Kamakura City)
- Advanced Technology R&D Center (Amagasaki City)
- Mitsubishi Electric Research Laboratories (US)
- Mitsubishi Electric R&D Center Europe (France/UK)

Functions of Overseas Hubs

- US & Europe: R&D of cutting-edge technologies
- China: Improvement in competitiveness of locally made products
- India: Locally-tailored development activities

- FA Development Center No.2 completed (July 2017)
- Nagoya Works
- Fukuyama Works
- China FA Development Centers
- China (Changshu)
- China (Dalian)
- India (Pune)
- Germany (Dusseldorf)
- North American FA Development Centers
- San Jose
- Chicago
- Boston
- European FA Development Center

© Mitsubishi Electric Corporation
1. Business Overview: Sales/Service Network

Extensive Sales/Service Network Covering 94 Countries Worldwide

Business Sites Added in FY17
- Mexico Queretaro FA Center (17/5)
- Mexico Monterrey FA Center (17/5)

Overseas Service Functions
- Product training
- Response to technical inquiries
- Supply of parts for repairs and service
2. Growth Strategy: e-F@ctory

Concept Advocated Since 2003

FA–IT Integrated Solution Proposing solutions for manufacturing that stays one step ahead by reducing total cost of development, production and maintenance through the utilization of FA and IT technologies

Programmable Controllers MELSEC Q Series
MES Interface Module
GOT-MES
C Controllers
Programmable Controllers MELSEC iQ-R Series
CNC MES interfaces
C Controllers with edge computing support functions

2003
2005
2006
2007
2014
2015
2016
2018

Concept announced
2010 e-F@ctory Alliance formed
2. Growth Strategy: e-F@ctory

Expertise Accumulated Inside/Outside of the Company, and Alliances with a Wide Variety of Partners

Track Record of Introducing to MELCO Production Lines and Customers’ Model Lines

Over 7,700 cases

Examples of introducing various applications

Changshu Innovation Center for Green & Intelligent Manufacturing (China)

Wide Variety of Partners

Approx. 610 participating companies*1
- Software partners (approx. 150)
- SI partners (approx. 310)
- Equipment partners (approx. 150)

Approx. 3,300 participating companies*1

Approx. 1,800 connectable products*1

CC-Link Partner Association*2

*1 No. of partner companies and connectable products as of March 2018.

*2 Organization promoting industrial network, CC-Link
2. Growth Strategy: e-F@ctory

Edge Computing – The Key to Using IoT

IT System Domain (including cloud)

Edge Computing Domain

Shop Floor Domain (Devices)

Primary processing of shop floor data
Feedback made close to shop floor

Necessary data

Edge

Real-time response

Shop floor data

Edgecross is an open software platform for the edge computing domain, which originated in Japan. It was created by Edgecross Consortium members, who interact outside the boundaries of corporations and industries with the aim of achieving FA–IT collaboration.

- Operates on any industrial-use computer regardless of manufacturer
- All data on shop floor collected
- Real-time diagnosis and feedback

Source: Edgecross Consortium

Operational benefits:

① Simultaneous operations improved
② Security ensured
③ Communication volume reduced

Reference: Ministry of Economy, Trade and Industry/Commerce and Information Policy Bureau/Information Economy Subcommittee/Industrial Structure Council’s “Working Group on Distribution Strategy (First Session)”

Source: Edgecross Consortium
2. Growth Strategy: e-F@ctory

Enhance Solution Proposal Capability through Utilization of Edgecross

IT Systems (including cloud)
- Strengthening partnerships through our Information Systems & Network Service Group and partner IT companies

Edge Computing
- Development of Edgecross–equipped industrial–use computers
  - MELIPC
- Development of application software
  - Real–time data analyzer
  - SCADA (MC Works64)

Shop Floor (devices)
- Enhancing connectivity between products
- Improving networks and the iQ Platform
- Improving compatibility among products, MELIPC, MELCO edge–computing applications
- Equipping products with AI
2. Growth Strategy: e-F@ctory

Mitsubishi Electric Service Solution That Takes Advantage of IoT

Production/Maintenance Support Service for Electrical-discharge/Laser Sheet Metal Processing Machines Offered through IoT Utilization

Dashboard Function

Visualization of operational/maintenance status

Remote Diagnostics Function

Remote diagnosis of processing machine status by support staff

Service launched in Japan (April 2016)
Total applicable machines: 600 units

Service to be introduced overseas beginning FY18
2. Growth Strategy: AI Utilization

Create “Smart Factories” Utilizing Mitsubishi Electric AI Technologies and Shop Floor Knowledge

- **Mitsubishi Electric AI Technologies**
  - Deep Learning
    - More compact algorithms
  - Reinforced Learning
    - More efficient learning through utilization of device domain knowledge
  - Big Data Analysis
    - More efficient chronological data analysis through utilization of device domain knowledge

- **Shop Floor Knowledge**
  - Manufacturing
  - Production technologies
  - Control
  - Drive
  - Machinery mechanisms
  - Process -ing
  - Service life prediction
  - Production preparation
  - Setup/Production
  - Operation/Maintenance

**Advantages of AI embedded Systems**

- Quick start-up
- Lean operations
- No disruption

- Reduces start-up time: Set-up time for facilities and production lines
- Improves yields/utilization rates by analyzing test results and operational status
- Advises optimal maintenance timing by predicting possible equipment breakdown

Applied to 7 models in FY18
2. Growth Strategy: Product Strategy

Enhance Product Lineups and Connectivity between Products

<table>
<thead>
<tr>
<th>Controllers</th>
<th>MELIPC links</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve engineering environment in pursuit of user-friendliness</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drive Control Devices</th>
<th>Enhanced iQ Platform</th>
</tr>
</thead>
<tbody>
<tr>
<td>AC Servos: Develop next series and improve basic performance</td>
<td></td>
</tr>
<tr>
<td>CNCs: Enhance functions by utilizing cutting-edge technologies and improving operability</td>
<td></td>
</tr>
<tr>
<td>Inverters: Enhance the range of large-capacity products</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mechatronics Products</th>
<th>Connectivity between products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical-discharge machines: Enhance product appeal in the area of high-precision processing</td>
<td></td>
</tr>
<tr>
<td>Laser-processing machines: Enhance product appeal in the fiber area</td>
<td></td>
</tr>
<tr>
<td>Robots: Develop robots capable of working with humans in pursuit of user-friendliness</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Rotating Devices</th>
<th>Enhanced networks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Three-phase motors: Strengthen ability to meet overseas regulations for high-efficiency operation</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power Distribution Controllers</th>
<th>Improved safety functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit breakers/Electromagnetic switchgear: Enhance product lineups for overseas markets</td>
<td></td>
</tr>
<tr>
<td>Transformers: Enhance product appeal through improved efficiency</td>
<td></td>
</tr>
</tbody>
</table>

© Mitsubishi Electric Corporation
2. Growth Strategy: Regional Strategy (Japan)

Reinforce Business Networks for the Base-load Market

◆ East Japan FA Solution Center (tentatively named) to be opened (July 2018, Akihabara)
  Exhibit products/solutions, Users’ school, User application testing

◆ New division dedicated to solution business established (April 2017, approximately 150 staff members)
  1. Solutions Business Division
  2. Dedicated sales teams (7 locations throughout Japan)

◆ Strengthen partnerships with sales partners/customers

  1. Equipment Distributors Association (celebrating 50th anniversary in FY18)
     ① Equipment distributors: approx. 200 companies
     ② Equipment dealers: approx. 400 companies

  2. 「RyoBankai」 (celebrating 50th anniversary in FY19)
     Switchboard/Control panel manufacturers: approx. 500 companies

  3. FATEC Club
     User members: approx. 16,000

  4. Mitsubishi Electric FA Product Information Site
     Registered users: approx. 300,000
2. Growth Strategy: Regional Strategy (China)

Enhance Resources for Sales, Development, Production and Services in China as the Priority Overseas Market

◆ Establish our position in IoT market using Chinese government’s guideline “Made in China 2025” as a spring board
1. Participate in government-sponsored seminars as a lecturer
2. Establish relationships with relevant government sectors

◆ Expand e-F@ctory usage in government projects
ITEI* Intelligent Production Model Line constructed (November 2017)
*ITEI: Instrumentation Technology and Economy Institute

◆ Strengthen local network to understand trend towards automation and IoT
1. Substantial increase in number of staff for sales, production, design and service
2. Increase number of e-F@ctory staff at sales companies
3. Reinforce sales bases for focus segments (e.g., government’s investment promotion regions)
4. Increase number of models manufactured in the consumption areas and expand locally procured materials

Approx. 2,600 (up 400 from FY17)
Approx. 50 (2x from FY17)
FY18: 4 locations (Hefei and others)
FY18: Robots
2. Growth Strategy: Regional Strategy (South Korea, Taiwan/ASEAN)

Korea/Taiwan – Maintain/Expand top-class share by winning projects in key segments
ASEAN – Strengthen business networks in anticipation of local company growth and additional investment by Japanese companies

◆Expand e-F@ctory partnerships

1. South Korea/Taiwan
   e-F@ctory Alliance formed (March 2018)

2. Taiwan
   ① MOU concluded with Taiwan Ministry of Economic Affairs for promotion of IoT (June 2017)
   ② e-F@ctory demonstration model exhibited at IoT experimental exhibition held in Taichung City

◆Key segments

Smartphones, LCDs/OLEDs, Semiconductors, Lithium-ion batteries, machine tools

◆Strengthen business networks

Reinforce business networks utilizing comprehensive sales company, and expand and improve local sales network

◆Key segments

Automobiles/Automotive components (including local Japanese affiliate companies), food processing and instrumentation

Partner Target No.
South Korea: 70 companies
Taiwan: 70 companies
2. Growth Strategy: Regional Strategies
   (India, Europe and Americas)

India – Strengthen Business Networks in Anticipation of Economic Growth and Sophistication of Manufacturing

Europe and Americas – Improve Position by Gaining Market Share in Key Segments/Regions

◆ Strengthen business networks

1. Expand sales network to north and central regions (e.g., Rajasthan)
2. Examination of setting up of new production base (see p.25)

◆ Key segments
Automobiles, food processing, pharmaceuticals, machine tools, and instrumentation

◆ Contribute to advancements in manufacturing through “Made in India” movement
Active participation in government-sponsored events (e.g., attract foreign investment)

◆ IoT and AI technology R&D
1. European FA Development Center: participate in Industrie4.0–related working group
2. North American FA Development Centers: Utilize new San Jose Center

◆ Enhance development activities to meet local needs in Europe and US
Europe: Foods, automobiles and instrumentation; Americas: Automobiles, air-conditioning and sanitation

◆ Key regions
Europe: Southern Europe, central and eastern Europe and Turkey; Americas: US Midwest and Mexico

© Mitsubishi Electric Corporation
2. Growth Strategy: Production Strategy

Strengthen Production Network and Establish Stable Supply Network to Achieve Mid-term Business Target

◆ Increase production capacity

1. Increase AC servos production
   - March 2018
   - 480,000 units/month (170% compared to FY16)

2. Increase Programmable Controllers production
   - June 2018
   - 190,000 units/month (160% compared to FY16)

3. Increase robots production
   - June 2018
   - Production started in China (Changshu)

◆ Procurement of parts and materials, and securing the workforce (labor)

1. Strengthen relationships with key suppliers in cooperation with procurement divisions across the company and diversify suppliers of parts and materials
2. Aggressively promote recruitment and improve employee satisfaction (e.g., upgrade welfare facilities)

◆ Reinforce production network to achieve mid-term business targets

Japan
Nagoya Works: Strengthen production network
1. Consider purchasing site for factory in Chubu region (FY18)
2. Construction of new factory building/office block (FY19–)

Overseas
Strengthen production network in consumption areas
1. Expand production bases in Changshu and Dalian areas in China
2. Consider establishing new production base (India)

◆ Establish Stable Supply Network

Improve and extend inventories of key parts and products

Reinforce BCP measures/Learn to manage sharp fluctuations in demand
2. Growth Strategy: Injection of Resources and Increase Workforce

Continuous Injection of Resources to Enhance Business Competitiveness

◆ Capital Investment

![Bar chart showing capital investment from FY12 to FY17 with a forecasted increase from FY17 onwards.]

◆ R&D

![Bar chart showing R&D investment from FY12 to FY17 with a forecasted increase from FY17 onwards.]

◆ Change in No. of Employees

![Bar chart showing the change in the number of employees from FY12 to FY17 with a forecasted increase from FY17 onwards.]

- **Capital Investment**
  - Increase production capacity and accelerate updating of factories

- **R&D**
  - e-F@ctory, edge computing-related products, Networks, next series

- **Employees**
  - Sales, production, design, quality assurance, and service staff
### 2. Growth Strategy: M&As

**① Complement Product Groups, Technological Fields, Etc.**

**② Ensure Sales/Service Networks, and ③ Obtain New Clientele**

#### Major M&As carried out in past five years (including joint capital investments)

<table>
<thead>
<tr>
<th>Country</th>
<th>Case</th>
<th>Aim</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan</td>
<td>Making AnyWire Corporation a subsidiary</td>
<td>Strengthen sensor network</td>
</tr>
<tr>
<td>US</td>
<td>Acquisition of a stake in ICONICS</td>
<td>Expand SCADA product lineup</td>
</tr>
<tr>
<td>Germany</td>
<td>Acquisition of KH-Automation</td>
<td>Enhance solution proposal capability</td>
</tr>
<tr>
<td>Japan</td>
<td>Acquisition of assets of Dura Systems Corporation</td>
<td>Enhance product development capability in edge computing</td>
</tr>
<tr>
<td>Japan</td>
<td>Takeover of part of business of NIPPON DENNO Co., Ltd.</td>
<td>Enhance product development capability in edge computing</td>
</tr>
<tr>
<td>India</td>
<td>Acquisition of MESSUNG</td>
<td>Expand sales channels and enhance product development function</td>
</tr>
<tr>
<td>Turkey</td>
<td>Acquisition of GTS</td>
<td>Expand Turkish business</td>
</tr>
<tr>
<td>Thailand</td>
<td>Acquisition of F.A.TECH</td>
<td>Enhance sales function</td>
</tr>
<tr>
<td>Japan/Asia</td>
<td>Making SETUYO ASTEC Corporation a subsidiary</td>
<td>Enhance sales network and expand business in ASEAN/Taiwanese markets</td>
</tr>
<tr>
<td>Russia</td>
<td>Takeover of ETS</td>
<td>Enhance business network</td>
</tr>
</tbody>
</table>

**Strengthened technical prowess: 11 cases in total**

**Expanded sales channels: 8 cases in total**
3. Mid-term Business Target

FY25 Business Target
Consolidated Sales: ¥900 billion+

- FY25 Business Target:
  - Consolidated Sales: ¥900 billion+
- FY25 Business Forecast:
  - Overseas ratio: 56%
- FY16 to FY20 Forecast:
  - Overseas ratio:
    - FY16: 49%
    - FY17: 52%
    - FY20: 54%

(JPY Billion)
Cautionary Statements

The expectation of operating results herein and any associated statement to be made orally with respect to the Company's current plans, estimates, strategies and beliefs, and any other statements that are not historical facts are forward-looking statements. Words such as “expects,” “anticipates,” “plans,” “believes,” “scheduled,” “estimated,” “targeted,” along with any variations of these words and similar expressions are intended to identify forward-looking statements that include but are not limited to projections of revenues, earnings, performance and production. While the statements herein are based on certain assumptions and premises that the Company trusts and considers to be reasonable under the circumstances to the date of announcement, you are requested to kindly take note that actual operating results are subject to change due to any of the factors as contemplated hereunder and/or any additional factor unforeseeable as of the date of this announcement.

Such factors materially affecting the expectations expressed herein shall include but are not limited to the following. As such, additional factors may arise at any given time.

1. Any change in worldwide economic and social conditions, as well as laws, regulations, taxation and other legislation
2. Changes in foreign currency exchange rates, especially yen/dollar rates
3. Changes in stock markets, especially in Japan
4. Changes in balance of supply and demand of products that may affect prices and volume, as well as material procurement conditions
5. Changes in the ability to fund raising, especially in Japan
6. Uncertainties relating to patents, licenses and other intellectual property, including disputes involving patent infringement
7. New environmental regulations or the arising of environmental issues
8. Defects in products or services
9. Litigation and legal proceedings brought and contemplated against the Company or its subsidiaries and affiliates that may adversely affect operations or finances
10. Technological change, the development of products using new technology, manufacturing and time-to-market
11. Business restructuring
12. Incidents related to information security
13. Occurrence of large-scale disasters including earthquakes, typhoons, tsunami, fires and others
14. Social or political upheaval caused by terrorism, war, pandemic by new strains of influenza and other diseases, or other factors