Supplements to Mid-term Business Plan
"Challenge 25"

June 6th, 2019
YASKAWA ELECTRIC CORPORATION

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Motion Control Segment
AC Servo & Controller Business
Overview of AC Servo & Controller Business

**Business overview**
- Development, production and sales of main components (AC servo motors, linear motors, machine controllers, etc.) incorporated in manufacturing equipment requiring high precision

**Strengths**
- World’s first servo motor called “Minertia motor” developed in 1958.
  - World's best performance and quality
  - Brand strength of global No.1 share
- Built strong relationship with top companies of various manufacturing equipment
  - Contributing to the sophistication and enhanced performance of machinery with pursuit of cutting-edge technologies

**Business opportunity**
- Sophistication of industrial machinery and labor saving
- Sophistication of industries such as 5G, IoT, and autonomous drive

**Market size (Assumption)**
- [FY2021] AC servo market Approx. 850 B.JPY
  - *Estimated by Yaskawa*
Targets for “Vision 2025” and “Challenge 25”

**Vision 2025**
Create new value in target markets, establish position as global top player, and become customers’ first choice

**Dash 25 (Achievements)**

*Development capability>*
- Expand robotics components
- Expand product lineup of components for production automation

*Products for robot applications (robot control modules, etc.)*

*Production capability>*
- Improve efficiency by Yaskawa Solution Factory production method
- Increase global production capacity

*Sales capability>*
- Boost sales by capturing smartphone-related demand

**Challenge 25 (Target)**

*Initiatives>*
1. Expand sales in growing markets by implementation of i³-Mechatronics
2. Expand sales in growing markets including China and Asia
3. Enhance production efficiency

*Financial targets>*

*Motion Control Segment*
- Net sales: 240.0 B.JPY
- Op. Income: 43.4 B.JPY
- Op. Income ratio: 18.1%

**Realize 25 (Target)**
Consolidate No.1 global market share by maximizing the components’ added value through i³-Mechatronics
Initiatives 1. Expand Sales in Growing Markets by Implementation of i³-Mechatronics

Increase sales by launching strategic products and implementing measures targeted at six growth markets

Measures

With robots
- Strengthen engineering capabilities
- Propose solutions for automation

Application optimization
- Differentiating customer equipment with application optimization which meets customer needs

Higher added value
- Pursuing the highest performance in the industry and leveraging our strengths in cutting-edge areas
- Enhance digital solution by IoT function

Strategic Products

- YRC1000micro
- Robot Module RM100
- Multi-axes Servo
- YRM Controller (Tentative name)
- Next-generation servo drive
- Data solution through i³-Mechatronics

6 Growing Markets

- Robotics
- Semiconductor
- Machine Tool
- Electronic Parts
- Metal Processing
- Packaging

FY2018

FY2021

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Initiatives 2. Expand Sales in Growing Markets including China and Asia

**Capture demand in growing markets by optimizing for applications and strengthening product functions adapting to market environments**

**Bolstering customization**
- Development and launch of next-generation servo drives with enhanced customer response capabilities
- Rapid development of use-optimized products by strengthening local development in China

**Fortifying product**
- Deliver new servo drives and more advanced products to local robot manufacturers and EMS
- Enhance quality of product in response to specific environments in local markets

**Examples of servo drive quality required in the Chinese and Asian Markets**
- Oil resistance
- Dust resistance
- Vibration resistance

**Increase in-store share in existing markets which and expected to grow steadily**

**Capture 3C market along with the growth of robot manufacturer**
Initiatives 3. Enhance Production Efficiency

Maximize profits by enhancing efficiency through expanding the latest production method of Yaskawa Solution Factory to global production

Create benefits of Yaskawa Solution Factory

① Global expansion of the latest production methods
② Improvement of productivity by promoting automation and preventive maintenance
③ Improve profits by promoting in-house production of parts

Implement the latest production methods from Japan into global bases

Optimal production through visualization of global production

Maximize profits with timely product supply based on supply chain optimized for regional demand
Motion Control Segment
Drives Business
### Overview of AC Drive Business

#### Business Overview
- Development, production, and sales of AC drives, matrix converters, high-efficiency motors and other components to improve performance and efficiency of machineries

#### Strengths
- Leading power electronics and high-efficiency motor technologies in the energy-saving field
- Control and sensing technologies accumulated over multiple years of experience in the motor drive fields
- Knowledge of machinery and equipment stemming from system engineering
- Global sales and service sites, development centers and production plants

#### Business Opportunity
- Expansion of infrastructure investment
- Continuous energy-saving needs
- Expansion of factory automation
- Growing markets in emerging countries

#### Market size (Assumption)
- **[FY2021]**
- AC drive market: Approx. 1,350 BJPY
  - *Estimated by Yaskawa*
Targets for “Vision 2025” and “Challenge 25”

**Vision 2025**
Become a drives specialist chosen by the customers through creating value in key markets

**Dash 25**
**〈Achievements〉**

- **Development Capability**
  - Accumulated application specific technology and skills
  - Released new AC drive series

- **Production Capability**
  - Initiated production of new AC drive series at 5 global factories
  - Validated the viability of ASEAN supply chain

- **Sales Capability**
  - Actively developed connection with customers
  - Initiated sales of new AC drive series

**Challenge 25**
**〈Targets〉**

- **Initiatives**
  1. Capture target markets through global enforcement of customer response capabilities
  2. Capture automation market by introducing predictive management technology
  3. Capture energy-saving application through new value proposals

- **Financial target**
  *Motion Control segment*
  - Net Sales: 240.0 BJPY
  - Op. Income: 43.4 BJPY
  - Op. Income ratio: 18.1%

**Realize 25**
**〈Targets〉**

Aim to achieve global share of 10% by increasing share in energy saving application
Initiative 1: Capture Target Markets through Global Enforcement of Customer Response Capabilities

Improve machine performance by expanding AC drive product lineup optimized for each application and provide quick service in each region.

General-machinery

Elevator

Crane

Air conditioner fan

Pump

General purpose AC drive

Application-specific AC drive

Programming

Built-in environmental function

Quick “Plus one” service

Development (4 sites), production (5 sites), and After-sales Service (150 sites)

* I/O: Input/Output
Propose new value through i³-Mechatronics and predictive management

Initiative 2: Capture Automation Market by Introducing Predictive Management Technology

Self-diagnosis function of AC Drives

Predictive function for AC Drive and machinery
- Internal parts of AC Drive
- Deterioration of machinery and equipment

- Operation life extension of machinery and equipment
  - Prevent machine and motor failures and shorten downtime
  - Prevention of demagnetization of synchronous motor
  - Suppression of compressor vibration

- Pre-existing products
  - Robot
  - Drives
  - Motion
  - Food machinery
  - Material handling machines

Other products (Sensors, Equipment, etc.)

Connected by data

Centralized data management tool at cell domain

YASKAWA Cockpit

Cloud Analytics
- IoT/AI Analysis/utilization of big data
- Modeling/ deep learning

Customers’ factory management system

Customers’ production planning management system

Model distribution

Data Delivery

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*Software under development
Initiative 3: Capture Energy-saving Application through New Value Proposals

Propose new added value through combining high-performance AC Drives and high-efficiency motors.

Expand Application Field

Energy Saving
- Energy saving devices
- High efficiency motors

Energy Saving No.1
- Energy conservation using AC Drive
  - AC Drive New series

Energy Saving No.2
- Energy Conservation using high-efficiency motor
  - SS7 motor

Energy Saving No.3
- Power regeneration
  - Matrix Converter

Energy Saving No.4
- Maximization of motor efficiency
  - New Control

Bundle proposal

Compressor
Air conditioner fan
Pump
Robotics Segment
Overview of Robotics Business

**Business Overview**
Development, production and sales of industrial robots suitable for various applications, including automotive, semiconductor, and general industries.

**Strengths**
- Developed the first Japanese all-electric multi-joint robot in 1977
  → Met growing needs for labor saving and automation at production sites
  → Achieved top-class global market share
- In-house production of servo motors; the most important element for performance of robots
  → Secured competitive advantage through improvement of robot performance and reduction of production costs

**Business Opportunity**
- Increasing automation needs of manual tasks against backdrop of labor shortages
- Sophistication of production through the use of IoT
- Reformation of manufacturing in the automotive industry

**Market Size (Assumption)**
【FY2021】
Industrial robot market: Approx. 1,600 B.JPY

*Estimated by Yaskawa*
Targets for “Vision 2025” and “Challenge 25”

**Vision 2025**

Become global No.1 robotics company through robotics solution that can realize “Revolutionary Industrial Automation”

**Dash 25 (Achievements)**

- **Development capability**
  - Expanded new product lineup (53 models)
    - Improved product competitiveness
    - Cost reduction through switch over
  - Released lineup of collaborative robot
  - Commercialized YASKAWA Cockpit

- **Production capability**
  - Enhanced global production capacity and improved profitability (Expansion of Changzhou factory, and establishment of new Slovenia factory)

- **Sales capability**
  - Improved relationships with customers by top management sales activities
  - Focused sales and development of new technologies in automotive, general and semiconductor markets

**Challenge 25 (Target)**

- **Initiatives**
  1. Expand orders in key markets (Automotive/General industries)
  2. Expand product lineup and technological domain by strengthening development capabilities

- **Financial target**
  - Sales: 210.0 B.JPY
  - Op. income: 27.3 B.JPY
  - Op. income ratio: 13.0%

**Realize 25 (Target)**

Aim to achieve global No.1 share through pursuing the development of solution based on “i3-Mechatronics” concept and contributing to expansion of manufacturing automation (as a result, expansion of Yaskawa’s business)
Initiatives 1-1 Enhance Engagements in Automotive Industry

Expand business in the automotive market by strengthening solution capabilities to cope with changes in production processes triggered by environmental concerns and electrification of vehicles, as well as expansion of manufacturing process automation.

**Engagements in Japan, EU, and the Americas**

Horizontal expansion of engagements with key automotive car manufacturers and component suppliers on a global scale.

**Capture Chinese automotive market**

Enhance solution proposal to key automotive manufacturers and component suppliers.

**Reinforce proposal capabilities by promoting new solution development**

- Respond to transformation of production process such as electrification of vehicles
- Strengthen system solution capabilities using robots
- Accelerate local development of optimized robots

Enhance Engagements in Automotive Industry
Initiatives 1-2 Enhance Engagements in the General Industries

- Expand market share in general industries through i³-Mechatronics concept
- Realize solution business through digital data solutions

Implement concept of i³-Mechatronics in collaboration with key customers by area / industry

Capture growing markets in China and Asia

Respond to rise of local competitors with differentiation strategies

Enter 3C markets in China and Asian countries

Expand sales of collaborative robots

Create automation solution that is optimal for installation of collaborative robots

- Cloud Analytics
  - IoT/AI
  - Analysis/utilization of big data
  - Modeling/ deep learning

- Customers' factory management system
- Customers' production planning management system

Centralized data management tool at cell domain

YASKAWA Cockpit

Connected by data

Robot
- Drives
- Motion

Other products (Sensors, Equipment, etc.)
Initiative 2: Expand Product/Technology Fields by Strengthening Development Capabilities

Feedback analysis based on various data and simulation results through digitalization of operating condition of components and equipment etc.

Realization of “Digital Twin”

YASKAWA Planning

Digital Environments

YASKAWA Cockpit

YRM Controller (Tentative name)

Production Site

Data Collection/Analysis/Feedback

Digital Environments

Digital environment

Real Environment

Digital environment

Real Environment

On-site digitalization

Generate Movement

Data Collection

Data Collection

Feedback

Total control of cell layer

Digital Environment

Real Environment

AI technology

AI technology

Data Collection

Feed-back analysis based on various data and simulation results through digitalization of operating condition of components and equipment etc.
Initiatives 3: Increase Productivity in Response to Volume Increases and Improve Profitability by Enhancing Productivity

Further improvement of production efficiency by strategic increase of production capacity at three global bases, and global implementation of Japan's production system

Global Production Capacity (Unit/Month)

<table>
<thead>
<tr>
<th>Year</th>
<th>Europe</th>
<th>China</th>
<th>Japan</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY2018</td>
<td>4,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY2021</td>
<td>6,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FY2025</td>
<td>6,000</td>
<td></td>
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</tbody>
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Global implementation

1. Establish highly efficient production system as the mother factory
   - Restructure each site in Japan and increase production efficiency
   - Promote Smart Factory concept

Global implementation

1. Increase production capacity in response to increased demand
   - Efficiency improvement through restructuring of Yaskawa China Robotics Plant No.1 and No.2
   - Expand capacity of Plant No.3

Global implementation

1. Gain market share through optimal local production
2. Build new supply chain in the European market

Full-scale production of new production site

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Systems Engineering
Environment and Social System Business
Restructuring of System Engineering Segment

Notes 1: Scope of System Engineering Segment is indicated by the red frames

New System Engineering Segment

Environment and Social System Business
- Specialized in environmental energy and social infrastructure business

Yaskawa Automation & Drives Corp.
- Specialized in industrial automation/drive business

System Engineering Segment was reorganized for the purpose of improving productivity and efficiency through optimizing functions within the Yaskawa group, effectively utilizing resources, and reducing indirect costs
## Overview of Environment and Social System Business

### Business Overview
- Development, production and sales of generators and converters for large-scale wind turbines, PV inverter for solar and electrical equipment for Ecoships
- Development, design and production of electrical systems for water treatment plants

### Strengths
- Power-conversion technologies (energy-saving and high-efficiency) of Yaskawa and strong technological capabilities of acquired Solectria*¹ and the Switch*², which were acquired
- Global sales network of Yaskawa, and strong customer base of the two companies acquired
- Achievements and system technology development capabilities gained in the public and industry sector

### Business Opportunity
- Renewable energy market, which will be the mainstay in the mid to long-term perspective → European offshore wind power → PV market in the U.S.

### Market Size (Assumption)

**[FY2021] Offshore Wind Power Market:**
- Approx. 80 B.JPY (Generator + Converter)

**PV Inverter market:**
- Approx. 400 B.JPY (3phase distributed PV inverter)
  *Estimated by Yaskawa

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*¹: U.S. subsidiary that manufactures and sells PV inverters
*²: Finnish subsidiary that manufactures and sells generators and converters for large-scale wind turbines
## Vision 2025

Capture the expanding needs of global renewable energy market, particularly in Europe and the U.S., and grow business in areas where Yaskawa’s energy conversion technology can be leveraged

### Dash 25 (Achievements)

<table>
<thead>
<tr>
<th>Development capability</th>
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<tbody>
<tr>
<td>• Introduced wind power generators for larger capacities</td>
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<tr>
<td>• Started in-house production of wind power converters</td>
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<tr>
<td>• Launched XG11000, new product for PV inverter, developed jointly by Japan and the U.S.</td>
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<table>
<thead>
<tr>
<th>Production capability</th>
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</thead>
<tbody>
<tr>
<td>• Completed preparation for mass production of wind power generators</td>
</tr>
<tr>
<td>• Integration of U.S. production sites</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Sales capability</th>
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</thead>
<tbody>
<tr>
<td>• Large-scale orders obtained for wind power generators</td>
</tr>
<tr>
<td>• Discontinued sales of unprofitable PV inverter products</td>
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</table>

### Challenge 25 (Target)

<table>
<thead>
<tr>
<th>Initiatives</th>
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<tbody>
<tr>
<td>1. Expand large-scale wind power generation business, focusing on offshore projects in Europe</td>
</tr>
<tr>
<td>2. Expand sales of new products and restructure PV inverter business</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Financial target</th>
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<tbody>
<tr>
<td>*System Engineering segment</td>
</tr>
<tr>
<td>Sales : 60.0 B.JPY</td>
</tr>
<tr>
<td>OP income : 1.8 B.JPY</td>
</tr>
<tr>
<td>OP income ratio : 3.0%</td>
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</table>

### Realize 25 (Target)

Expand business area of renewable energy market into new regions (Asia, etc.) and fields (energy storage applications, etc.), based on business built up in “Challenge 25”
Initiative 1: Expand Business of Electrical Appliances for Large-scale Wind Turbine

**Expand business to key wind turbine manufacturers, especially in Europe**

- Expand orders by strengthening top management sales strategy
- Secure profitability by deploying cost-cutting initiatives
- Establish mass production framework of next-generation large-scale generators

**Create new global business opportunities**

- Determine commercialization of large-capacity converters
- Acquire offshore wind power projects in Japan (Promote activities to be assigned as designated supplier from power distributor)
- Develop converters for energy storage applications

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**Expand sales to key European wind turbine manufacturers**

- Vaasa Plant
  - Development of converter
  - Production of converter
  - Production of generators
- Lappeenranta Plant
  - R&D hub, development of generator (prototype manufacturing and testing)
  - Production of generators
- YASKAWA Europe
  - The Switch
    - HQ of Wind Power Business
- Helsinki HQ

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**Environment and Social System**

- Global development, production and quality control HQ of Asian operations

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**Development function**

- Development and production of drive module for wind power

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**Sales function**

- Sales/Engineering in Japan
- Support of Asian sales
- After-sales service

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**Permanent magnet type synchronous generator**

**Full-power converter (FPC)**
Initiative 2: Stable Profitability by Reorganization of PV Inverter Business

- Expand sales by introduction of new products (XGI1000)
- Improve profitability through business restructuring

Expand orders and improve profitability of the U.S. business
- Expand orders through release of new PV inverter (XGI series)
- Improve profitability by strengthening sales strategies of XGI1000
- Develop new products that support energy storage applications

Restructure business in Japan
- Expand orders in the private energy consumption market through solution proposal
- Expand orders for high-voltage projects through XGI series

Reform Business Structure in the Americas
- Increase efficiency by continuous reorganization of Solectria

YASKAWA America Solectria Renewables
- HQ of PV Inverter Business
- Production site for PV inverter
- Repair center
- Core R&D hub
- Head of Americas and U.S. Sales
- Field service
- Sales in Central and South America
- Product manufacturing

Environment and Social System
- Global development, production and quality control HQ of Asian operations
- Core (Partial) and local development
- Head of Asian regional sales & marketing
- Japanese sales, after-sales service, and application development

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The Company changed its accounting period in fiscal 2017 from March 20 to the last day of February. The results of fiscal 2017 are shown as <reference>. The <reference> figures are based on an assumption that the accounting period remained unchanged (from March 21, 2017 to March 20, 2018).

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