

Medium-Term Business Plan “FY2019 MTBP” (FY2019 - FY2021) Precision Machinery and Robot Company

October 2, 2019

Kawasaki Heavy Industries, Ltd.

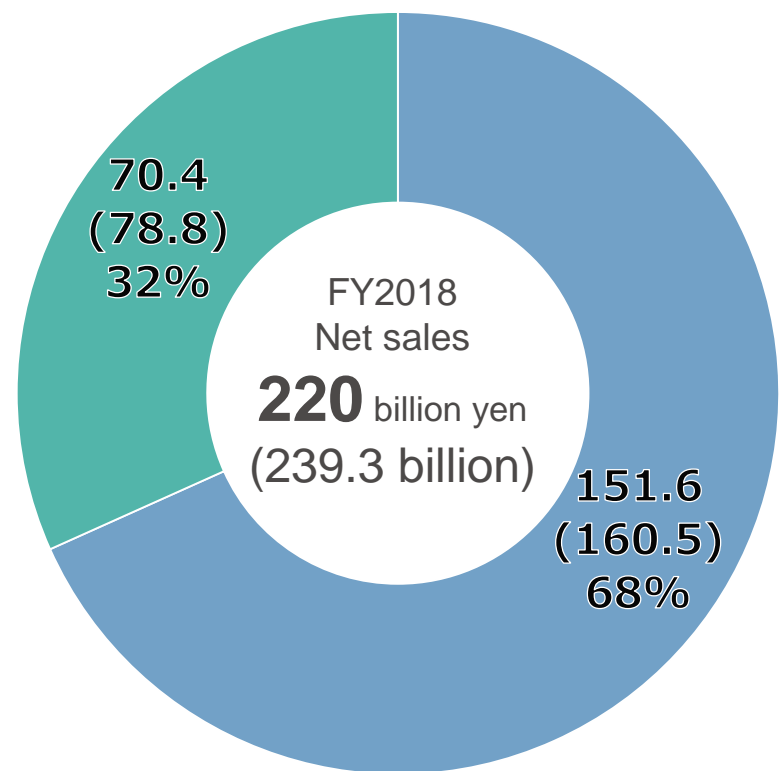
Table of Contents

1. Segment Overview	P3
2. FY2019 MTBP Business Strategy	P4-18
3. FY2019 MTBP Quantitative Goals	P19-20
4. Long-Term Direction Until FY2030	P21-23

Overview of Precision Machinery and Robot Company

Business	Market/main models
Precision machinery	<ul style="list-style-type: none"> Hydraulic equipment and systems for construction machinery Hydraulic equipment and systems for industrial machinery Marine equipment (steering machines, deck machinery) 
Robots	<ul style="list-style-type: none"> Spot welding robots Explosion-proof painting robots Human-combined robots Clean robots 

- Precision machinery BC
- Robot BC



() includes sales to affiliate companies outside segment

Business Strategy of Precision Machinery Business Center

Business Environment

- Positive
 - Demand for excavators will increase mainly in emerging countries in the medium to long-term
 - The Indian market will expand as the population increases and urbanization continues
 - Labor shortages in construction and agriculture/trends toward IoT/ICT
 - Hydrogen gas valves for FCV as a new field
- Negative
 - Uncertainty about the future of the Chinese excavator market
 - The rise of Chinese hydraulic equipment manufacturers

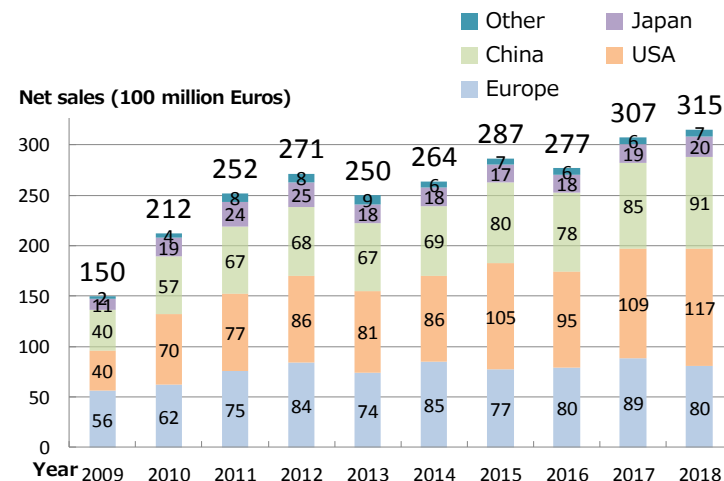
Our strengths

- Ability to respond to automated/unmanned construction machinery (system capabilities including electric control technologies)
- Ability to develop environmentally friendly products
- Production and sales bases in major areas around the world (Japan, England, US, China, Korea, India)

Issues

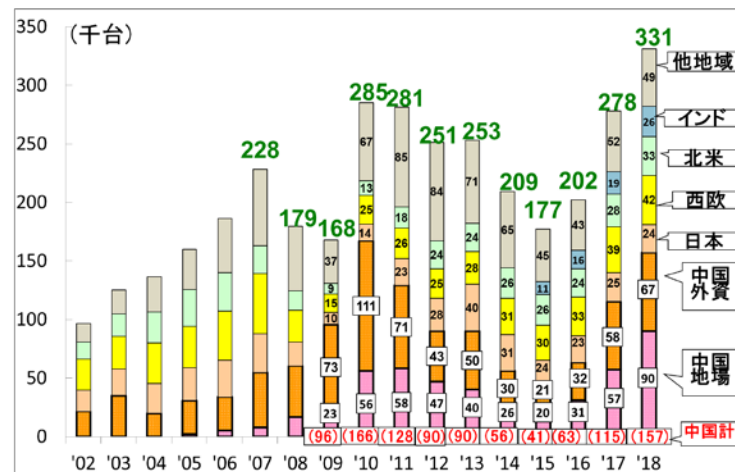
- **Increasing price competitiveness**
 - Responding to the increasingly complex Chinese market
 - Strengthening network of overseas bases
- **Building a new revenue foundation**
 - Expanding sales to construction and agricultural machinery aside from excavators
 - Developing new products/businesses (Hydrogen gas valves for FCV, products with synergy with robot businesses, etc.)

Global hydraulic market (approx. 4 trillion yen)



Source: Japan Fluid Power Association

Trends in sales numbers of excavators worldwide

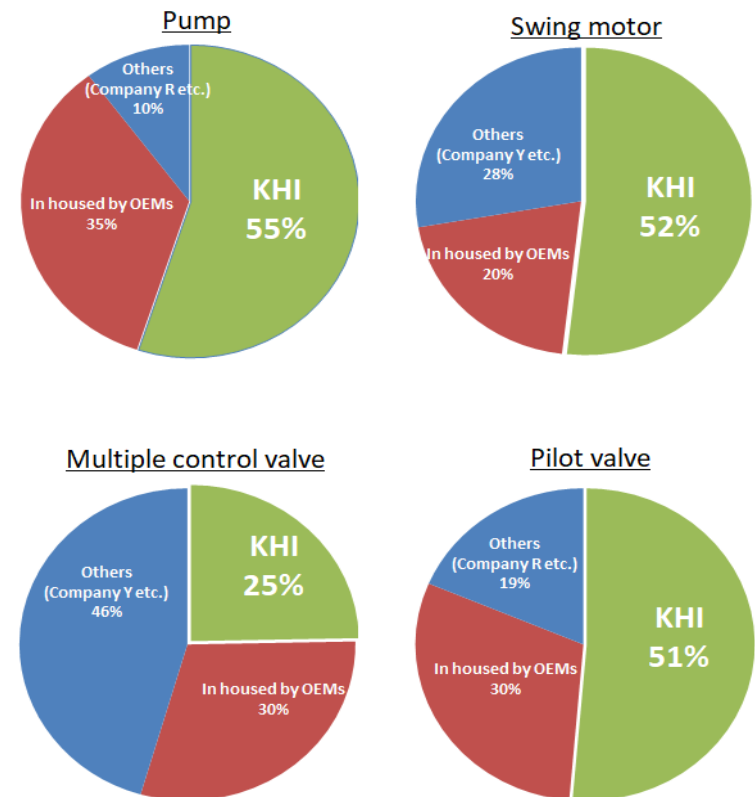


Source: Internal Estimates

The role of KHI products in construction machinery



Market share by product (Excavator FY2018)



Business Strategy of Robot Business Center

Business Environment

■ Positive

- Global demand for robots will increase in the medium to long-term
- The robot business field will increase due to aging societies

■ Negative

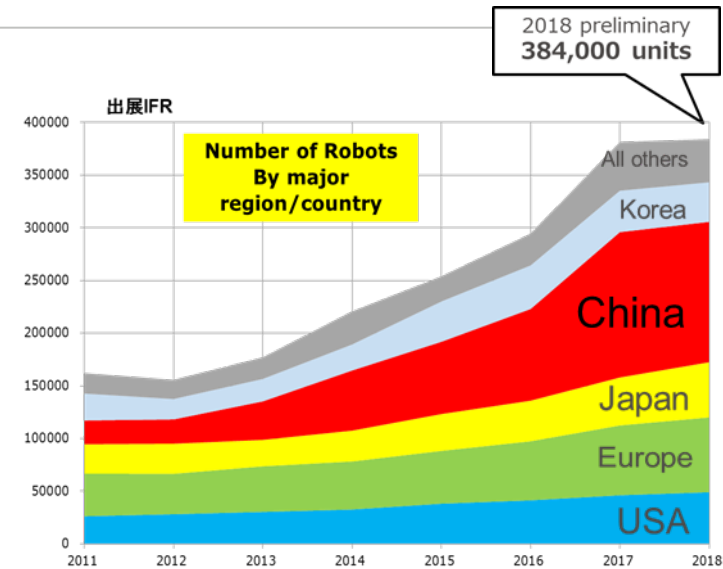
- Reduced customer facility investment due to US-China trade friction
- Delayed recovery in semiconductor market conditions
- Continued state of strong yen

Our strengths

- Global top share for clean robots
- Power to propose system solutions (for automobiles, etc.)
→ In-house multi-sector robot market, synergies present
- Robot arm development capabilities
- Future robot business development (medical, successor-collaborative robots, humanoid, etc.)
- After-sales service power: strong, trusting relationships with customers

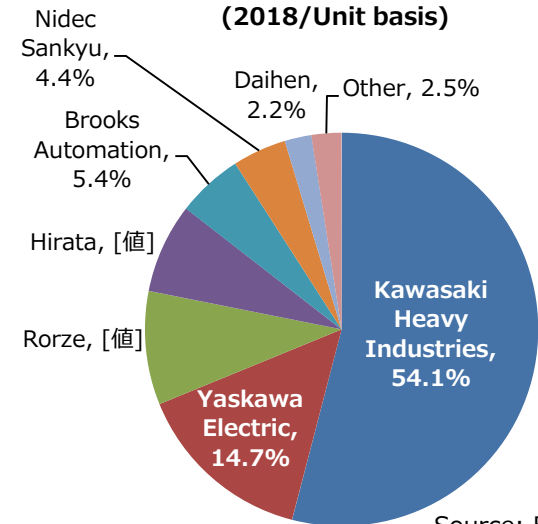
Issues

- Strengthening brand power for general customers (strong for specific customers)
- Developments and challenges in new growth fields
→ Investing management resources
- How to function as a division of a general heavy industry manufacturer



Semiconductor wafer transport robot share

(2018/Unit basis)



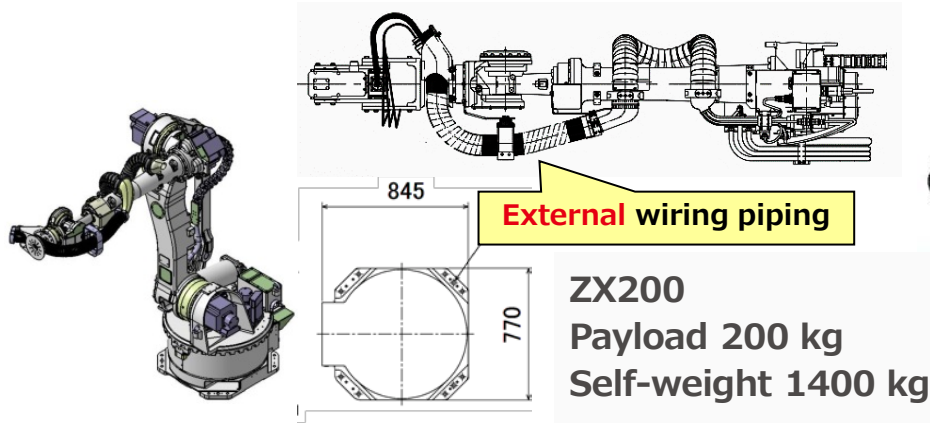
Source: Fuji Keizai

Market-Oriented Development of Spot Welding Robots

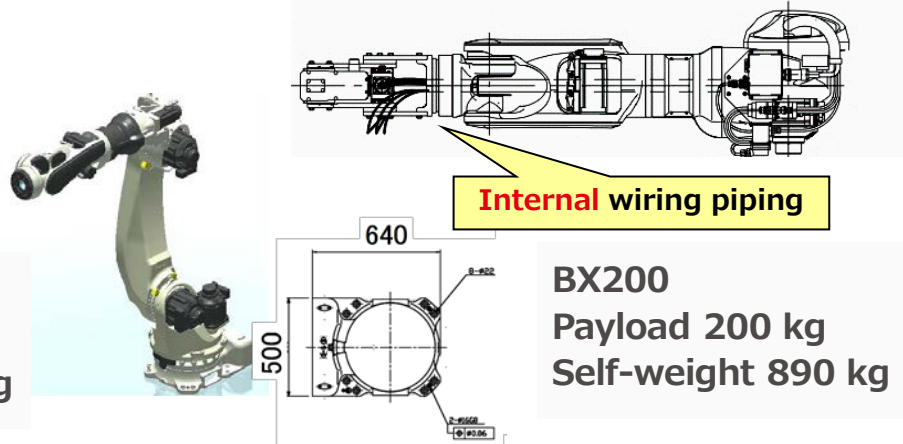
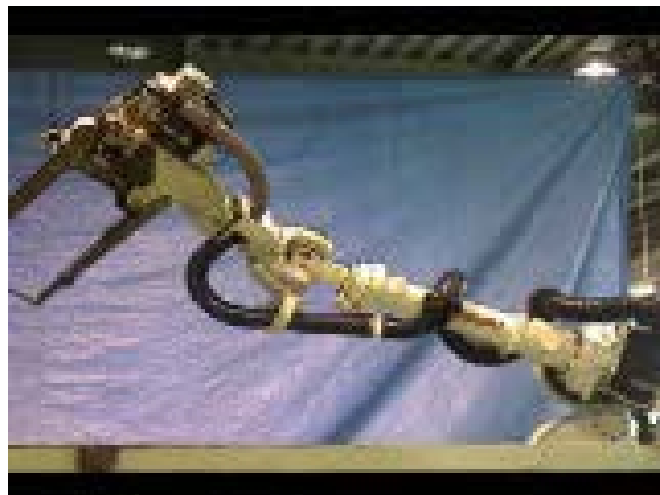
(Toward reducing the weight of the arm - payload/self-weight = 1)

Arms with internal wiring

- Increased off-line teaching efficiency
- Increased on-site startup efficiency



Self-weight/payload = 7

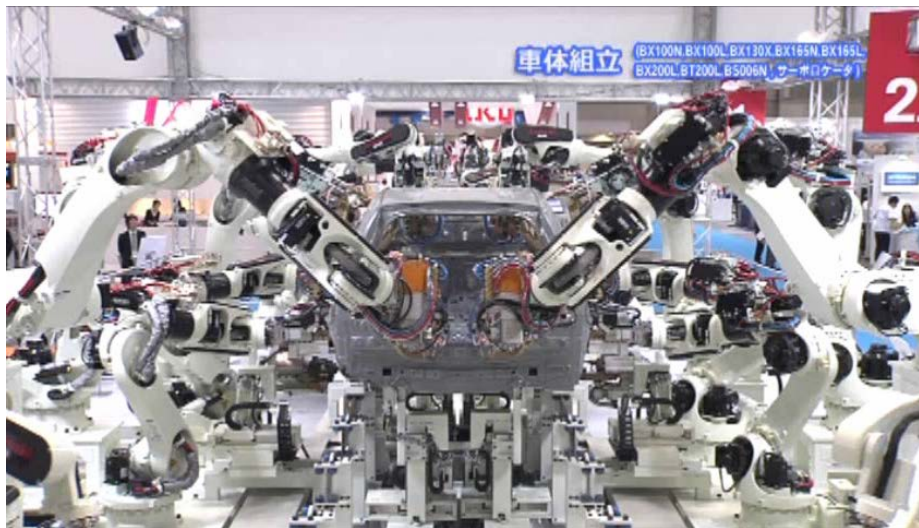


Self-weight/payload = 4.45



New Proposal for Line Building by utilizing multiple Robots

High Density Layout



Installed 12 units in the one spot-weld stage by high density layout.
(Used to be only enable to install 4-6 robots/Stage)

Outcome from above UB/MB

Initial investment	△40%
Overall line space	△40%
	(only for robot line 1/2~1/3)
Line tact time	△66%

Setter Process by Robots

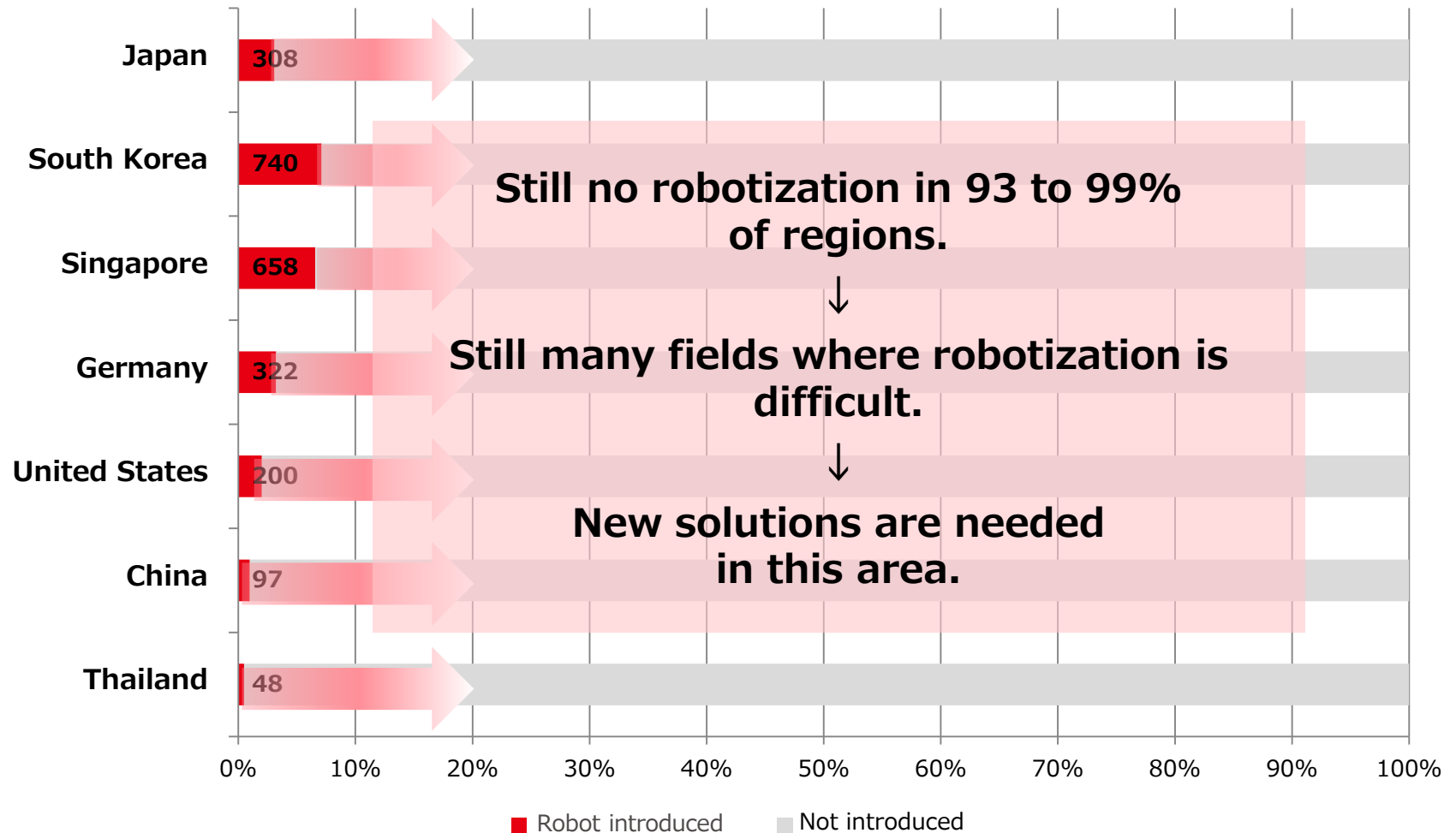


Robotized setter process, where the process was used to be handle by dedicated machine.

Outcome from robotization

Initial investment	△30%
Overall line space	△30%
Duration for installation	△20%

Number of Industrial Robots Used per 10,000 Manufacturing Employees (2017)



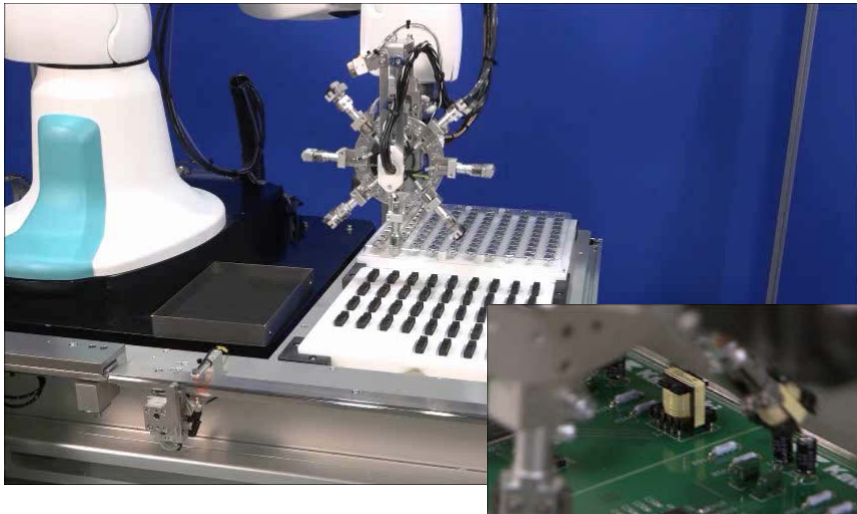
*Source: IFR Statistics Department, World Robotics 2018

■ Example 1 of Future Robot Initiatives (Collaborative, Remote Cooperative Control)

- duAro, cardboard box assembly and product packing



- duAro, for assembling irregular electronic components



- Successor, for painting



- Successor, for grinders

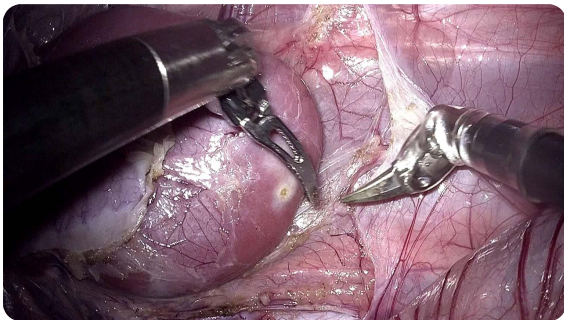


■ Example 2 of Future Robot Initiatives (Medical, Humanoid)

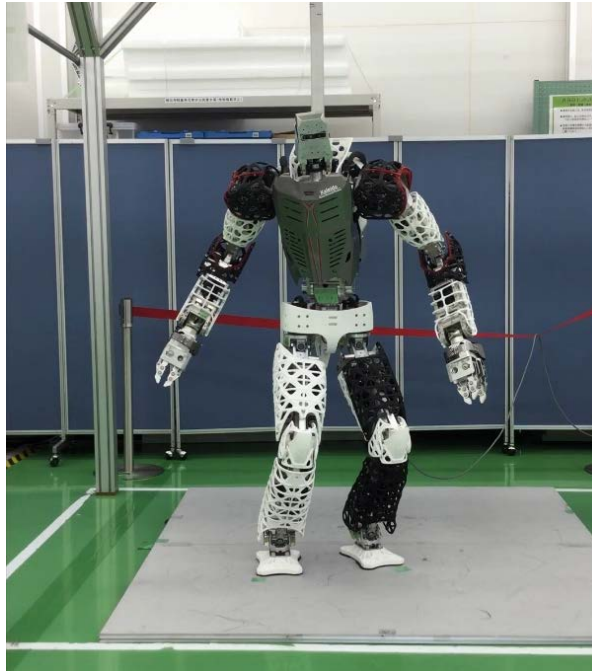
■ Medical robot console



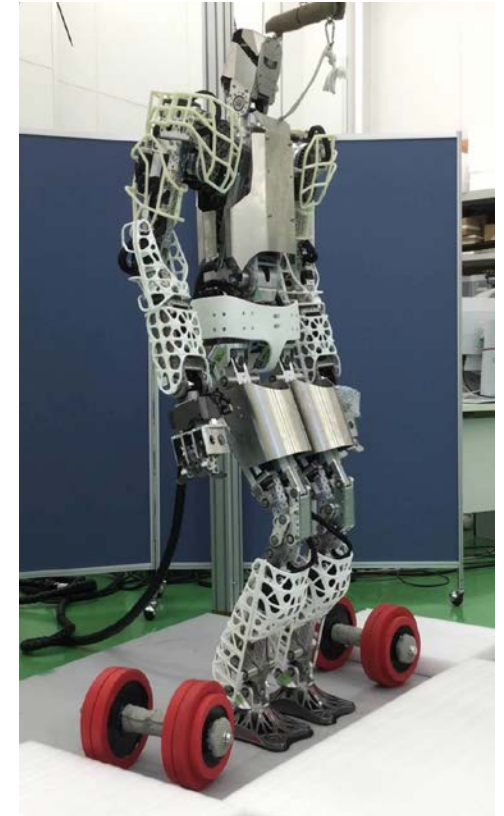
■ Medical robot animal experimentation



■ Kaleido (humanoid robot)



Height: 184 cm; weight: 85 kg



Two 25-kg dumbbells

2. Business Strategy of Precision Machinery and Robot Company (1/2)

Overall policy (2019-2021)

1. Company management policy

- Aim to generate stable revenue and cash in existing fields.
- Actively make upfront investments in new fields to support future businesses, and create new businesses.
- Accelerate global expansion.

2. Items to be handled during the MTBP to address issues of priority throughout the company

Improve profitability/pursue improved free cash flow

- Maintain/expand market share in existing fields
- Create networks for production and supply in the world's optimal areas
- Reduce foreign exchange risk

Business model innovation

(integrating with the latest technologies such as IoT/AI/robot technologies)

- Launching and expanding sales of surgery assistance robots
- Create new businesses in the collaborative/cooperative fields, such as duAro and Successor
- Humanoid robots
- Introducing robot control technology to hydraulic fields to promote the robotization of construction machinery
- Hydrogen gas valves for FCV

2. Business Strategy of Precision Machinery and Robot Company (2/2)

Precision machinery BC



from

Till now

- Sales strategy
 - Focused on excavators
- Production strategy
 - Mother factories in Japan

カワる、サキへ。
Changing forward

to

From now

- Sales strategy (for new markets)
 - Responding to future construction equipment
 - Expanding into agricultural machinery field
 - Hydrogen gas valves
- Reduction strategy (networking)
 - Global production/procurement
 - Supply to the world from low-cost factories

- Integration with IoT/AI/robot technologies



- Development/launch of synergy products for hydraulics × robots

Future

- General robot manufacturers
 - Vehicle body assembly + painting + semiconductors
 - Human-collaborative
 - Successor
 - Medical

Robot BC



from

Till now

- Focused on automobiles

Present

- Vehicle body assembly
- Painting
- Semiconductors
- General industrial machines

カワる、サキへ。
Changing forward

to

2. Business Strategies by Product/Market (Precision Machinery Business)

Measure

Business stage: stable/recovery

Role during MTBP: securing high revenue

[Construction machinery]

- Responding to the automation of construction machinery
 - Future construction machinery utilizing electric control technology/robot control technology (from ICT construction equipment to the robotization of construction equipment)
- Developing and expanding sales of environmentally-friendly products
 - Developing and expanding sales of electric/energy-saving/low-noise devices and systems
- Accelerating sales expansion in the agricultural machinery field
(Building a business structure that does not depend on performance with respect to construction machinery demand)



[Industrial machinery/marine devices/new fields]

- **Existing fields**
 - Developing and expanding sales of environmentally-friendly hydraulic equipment and systems (power-saving hybrid hydraulic devices/systems for industrial machinery, failure diagnostic systems for marine steering equipment)
- **Creating new businesses**
 - Full-scale development of FCV hydrogen gas valve business
 - Developing products by exploiting synergies with robot businesses

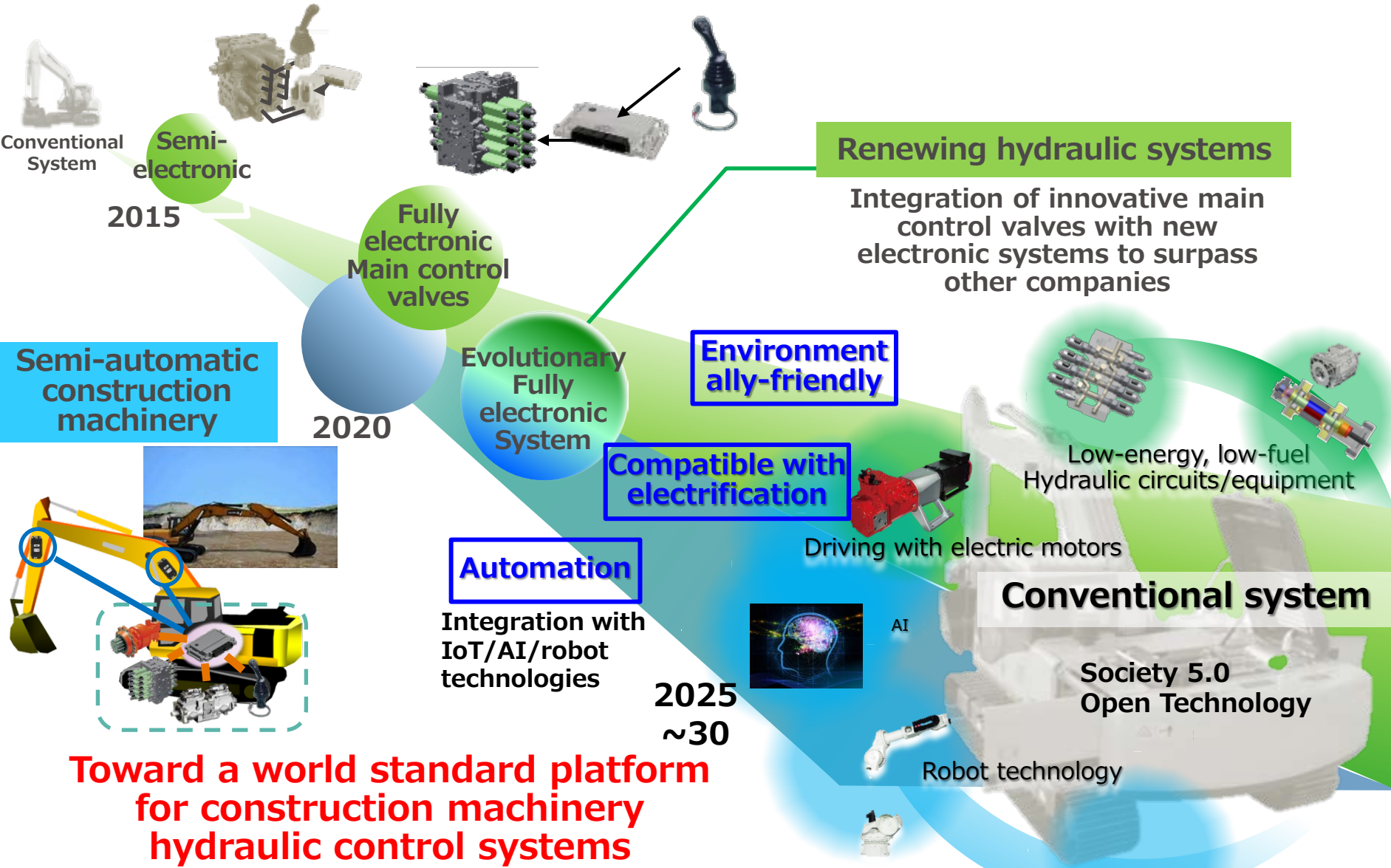


FY2018 sales ¥160.5 billion → FY2021 ¥185 billion

Precision
machinery

2. Business Strategies by Product/Market (Precision Machinery Business)

~ Toward future systems (IoT/ICT construction equipment) ~



2. Business Strategies by Product/Market (Precision Machinery Business)

~ Application in hydraulic robots ~

Driving source for industrial robots

- Past: hydraulic
- Present: electric
- Future: electric + hydraulic

Advantages of hydraulic

- Resistant to impacts from the exterior
- Broad range of speeds, from low to high, are possible



2. Business Strategies by Product/Market (Robot Business)

Measure

Business stage: growth
Upfront investment
(medical)

Role during MTBP: securing high revenue
New business fields
(medical)

[General purpose]

Increase profits by proposing new robots and expanding system market share

Strengthening ability to propose vehicle body assembly line builders, expanding sales of painting robots, capturing increased demand for cooperative robots



[Semiconductors]

Increase profits by expanding existing fields and developing new fields

Expand market share in pre-processing fields

Expand vacuum robot field

Enter post-processing field and gain market share



[Medical]

Develop new technologies that meet market needs, differentiate through medical applications of industrial robot technology

Early launches of surgery assistance robots, enhanced competitiveness through cooperation with partners using appropriate pricing and open platforms

FY2018 sales ¥78.8 billion → FY2021 ¥118 billion

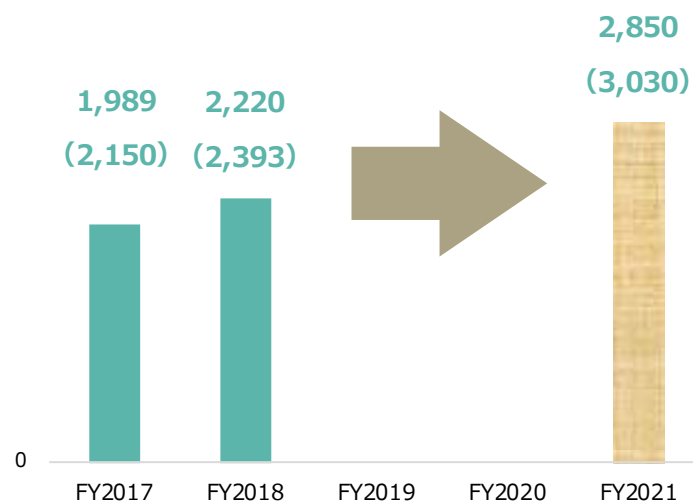
Robots

FY2019 MTBP Quantitative Goals

Net sales

(Unit: 100 million yen)

5,000



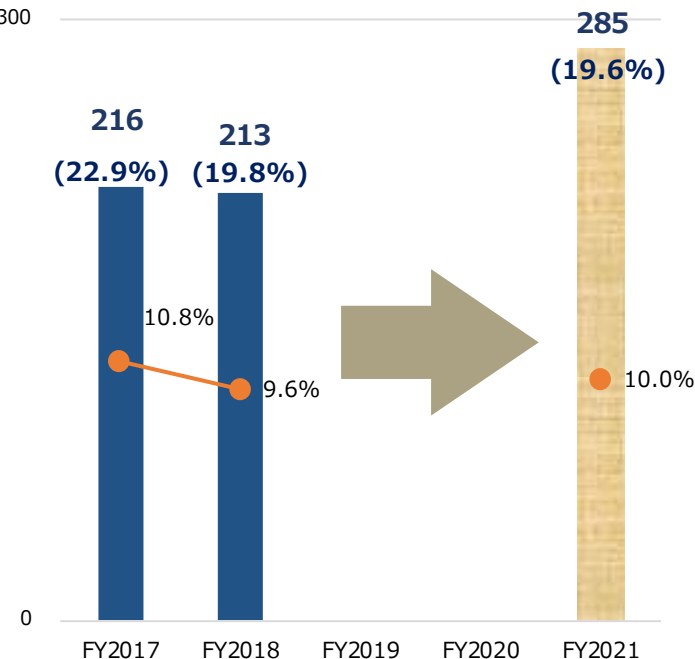
Operating profit

(Pre-tax ROIC)

(Unit: 100 million yen)

300

Operating margin

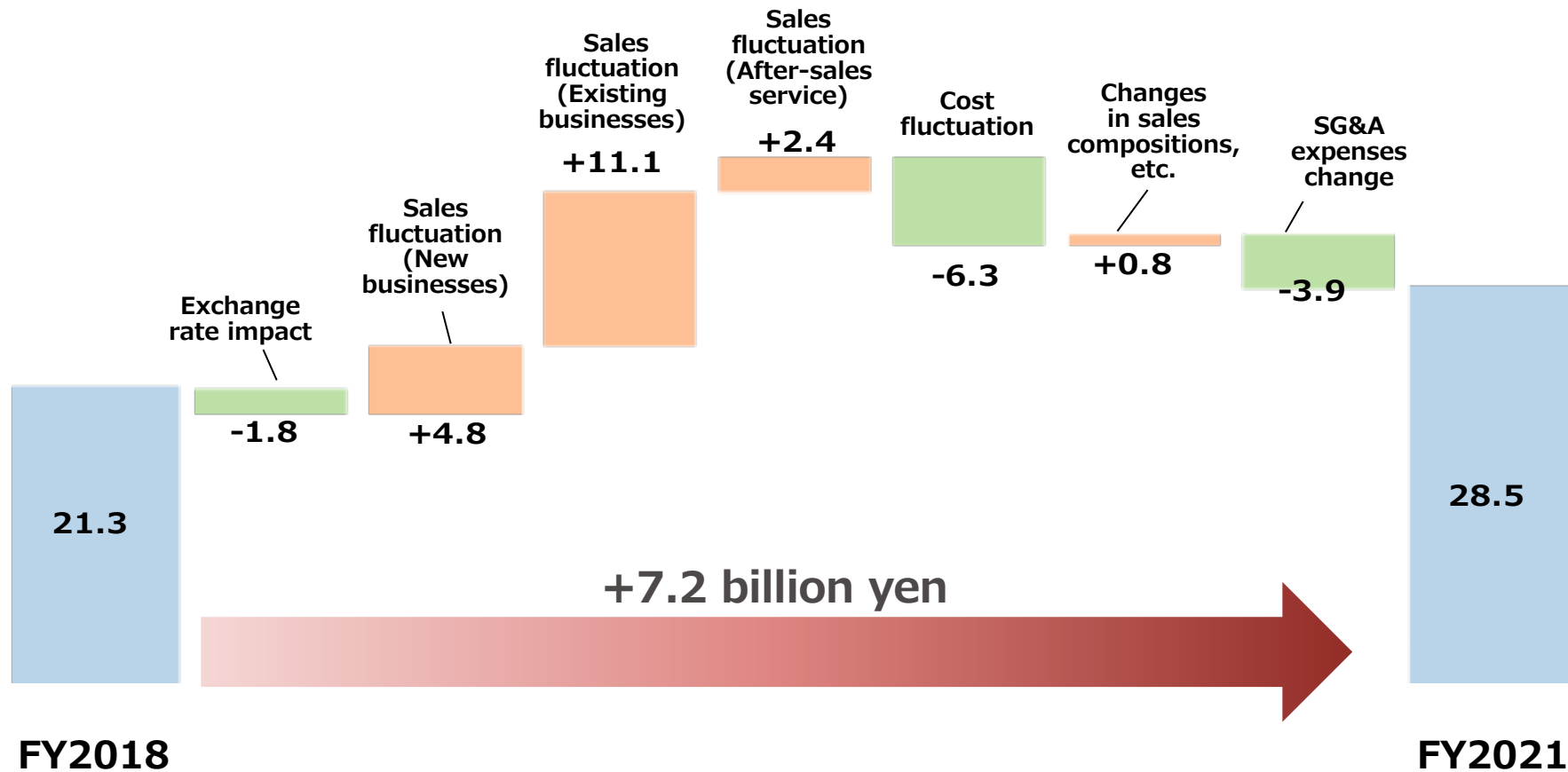


- Precision machinery: increased profits due to increased sales (expanding sales outside excavator field, etc.)
- Robots: increased profits due to increased sales (recovery of semiconductor market, etc.)

() includes sales to affiliate companies outside segment

3. Measures for Improving Operating Profit

- FY2018 results: 21.3 billion yen ⇒ FY2021 plan: 28.5 billion yen



4. Long-Term Direction Until FY2030

— Growth strategy and business model innovation toward 2030

Emergence of new values/markets

- ✓ IoT/AI/robot technologies
- ✓ Automated/unmanned construction and farming sites
- ✓ Rapid expansion of agricultural machinery market due to global population growth
- ✓ Realization of FCV society
- ✓ Acceleration of EV and HV
- ✓ Expansion of robot business area due to shrinking labor force
- ✓ Increased demand for service robots

Current businesses



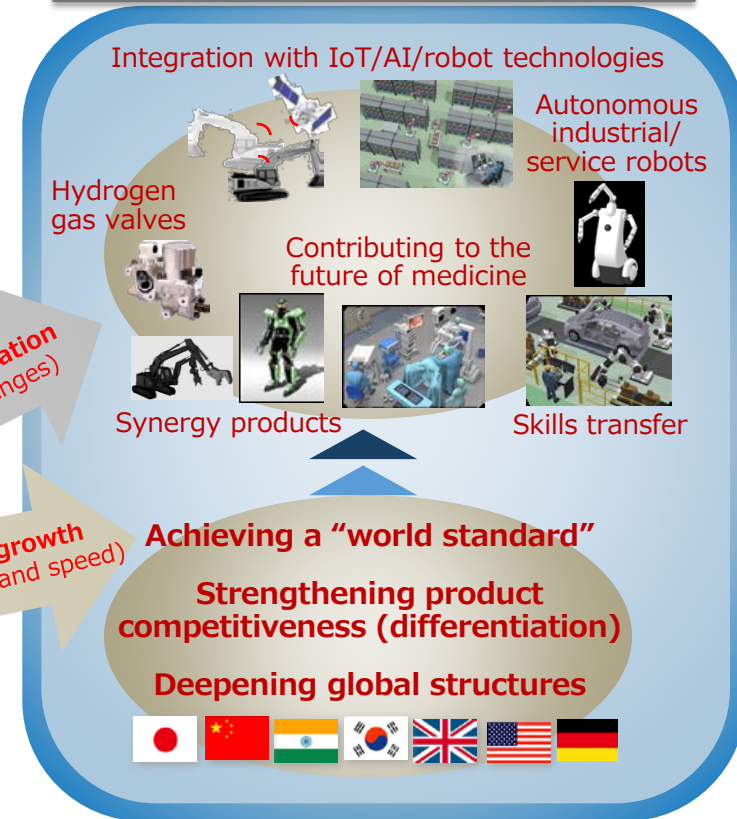
MTBP 2019

- ◆ Creating new businesses
- ◆ Generating stable revenue and cash in existing fields
- ◆ Accelerating global expansion

Non-continuous innovation
(New ideas and challenges)

Continuous growth
(Thoroughness and speed)

Business image for 2030



Robots + IoT + AI will Change the Way Industry Works.

Controlling/monitoring factories around the world from one location



Successor system

Network/IoT

Robots + AI

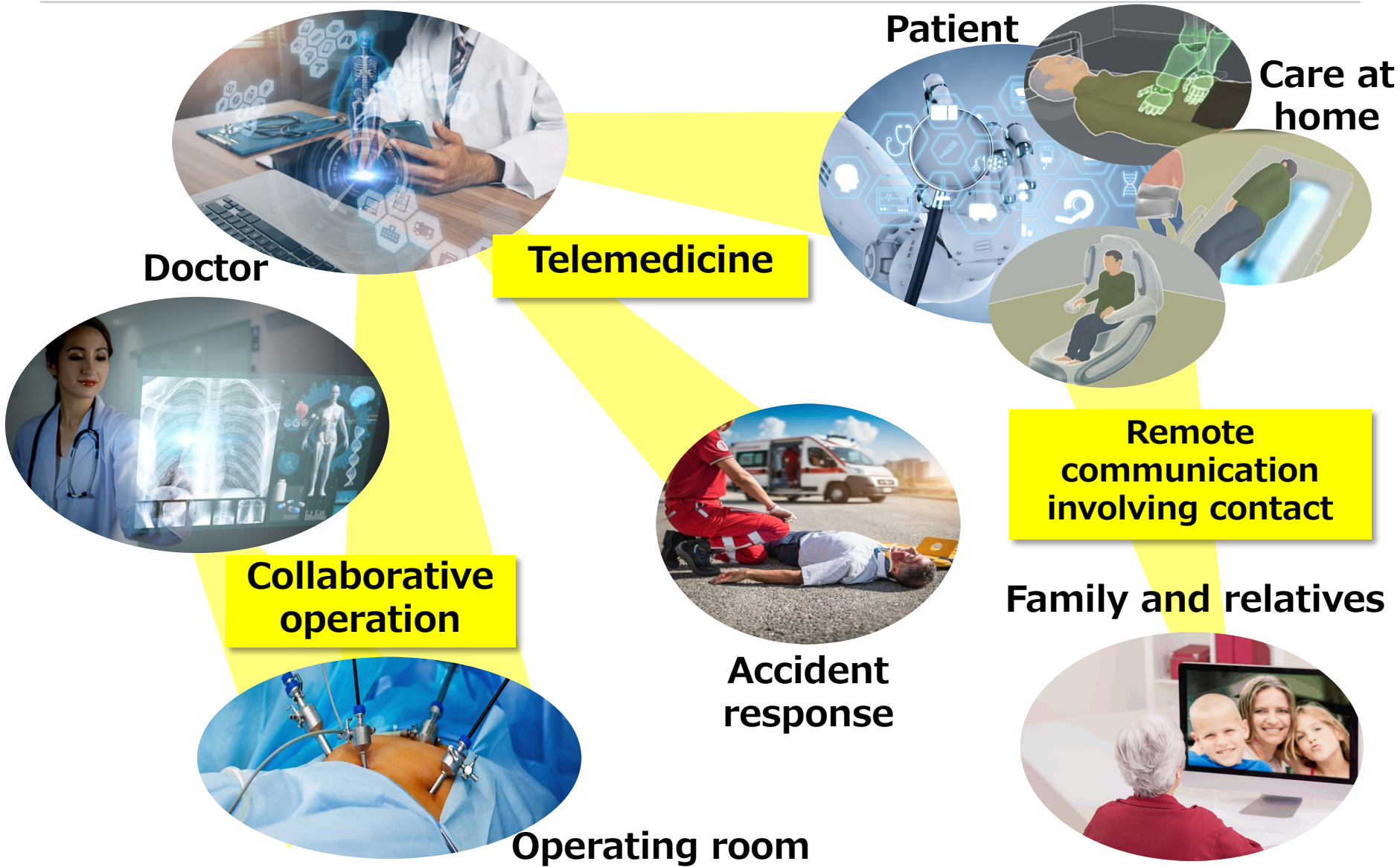
Domestic factory

Chinese factory

European factory

US factory

“Medical robot + AI+IoT(5G)” will change the future of the current medical issues



Kawasaki, working as one for the good of the planet

“Global kawasaki”

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