Robotics Business Presentation for Investors

UMS
Unmanned Systems

SMT
Systems

FA
Industrial Robots

SEMI
Semiconductor
Back-end Processes

OTA, Hiroyuki
Chief General Manager of
Solution Business Operations

Robotics Business Unit - Overview

Employees
1,904
(ended Jan. 2021)

Founded
1984
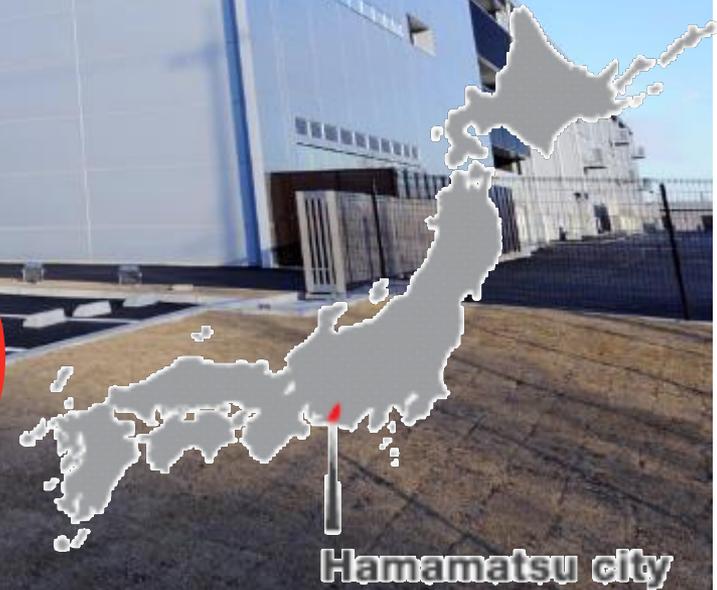
FY2020
Net Sales
(consolidated)
83.0
Billion ¥

37
years of
experience
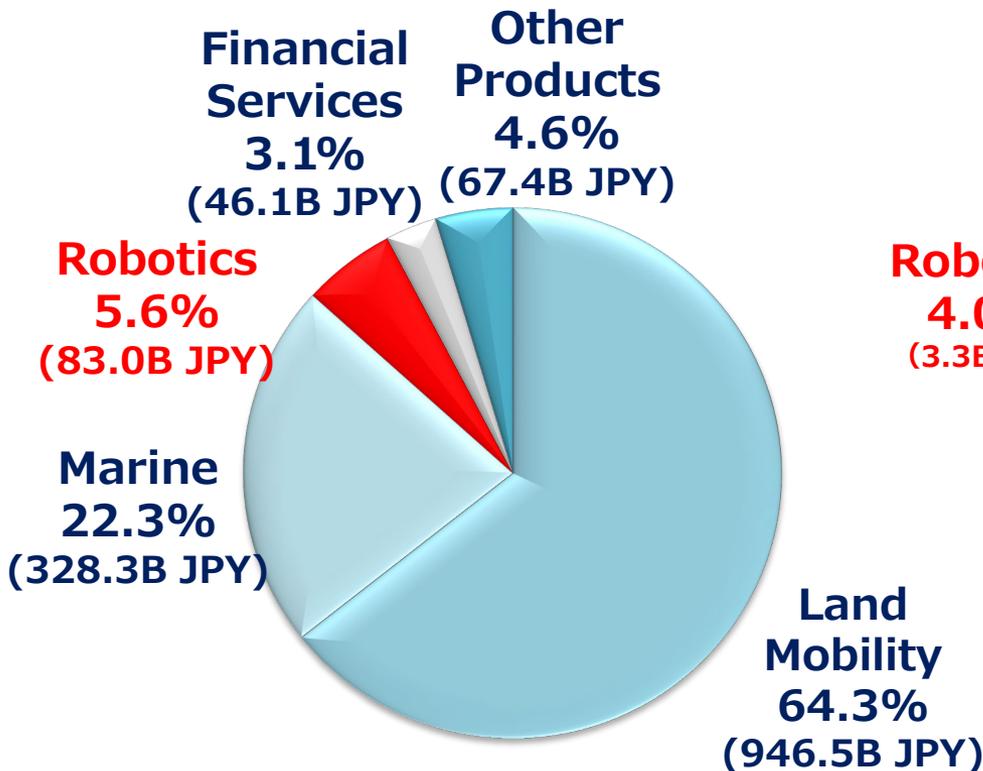and tradition

**Hamamatsu,
Japan**
Head Office

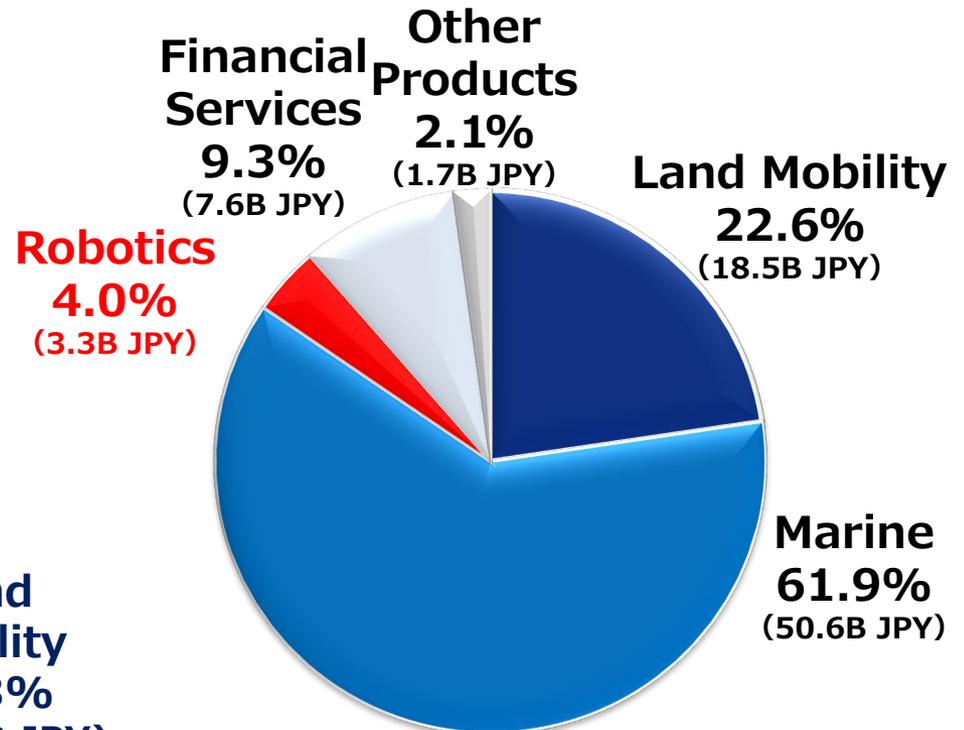Hamamatsu city

2020 Sales Profile (Consolidated)

Net Sales = 1,471.3B JPY
Operating Income= 81.7B JPY

Net Sales

Financial Services 3.1% (46.1B JPY)

Other Products 4.6% (67.4B JPY)

Robotics 5.6% (83.0B JPY)

Marine 22.3% (328.3B JPY)

Land Mobility 64.3% (946.5B JPY)

Operating Income

Financial Services 9.3% (7.6B JPY)

Other Products 2.1% (1.7B JPY)

Robotics 4.0% (3.3B JPY)

Land Mobility 22.6% (18.5B JPY)

Marine 61.9% (50.6B JPY)

Robotics Business Products

SMT Systems

FA Industrial Robots

SEMI
Semiconductor Manufacturing Systems

UMS
Unmanned Systems

Global Network

🔴 Robotics Business Unit base   🟡 Branch Office   🟢 Robotics development base

Europe

Yamaha Motor Europe N.V. IM Business
Neuss, Germany

Japan

Yamaha Motor Advanced Technology Center

Yokohama, Kanagawa

U.S.A.

Yamaha Motor Corp., U.S.A. IM Division

Marietta, Georgia

China

Yamaha Motor IM (Suzhou) Co., Ltd.
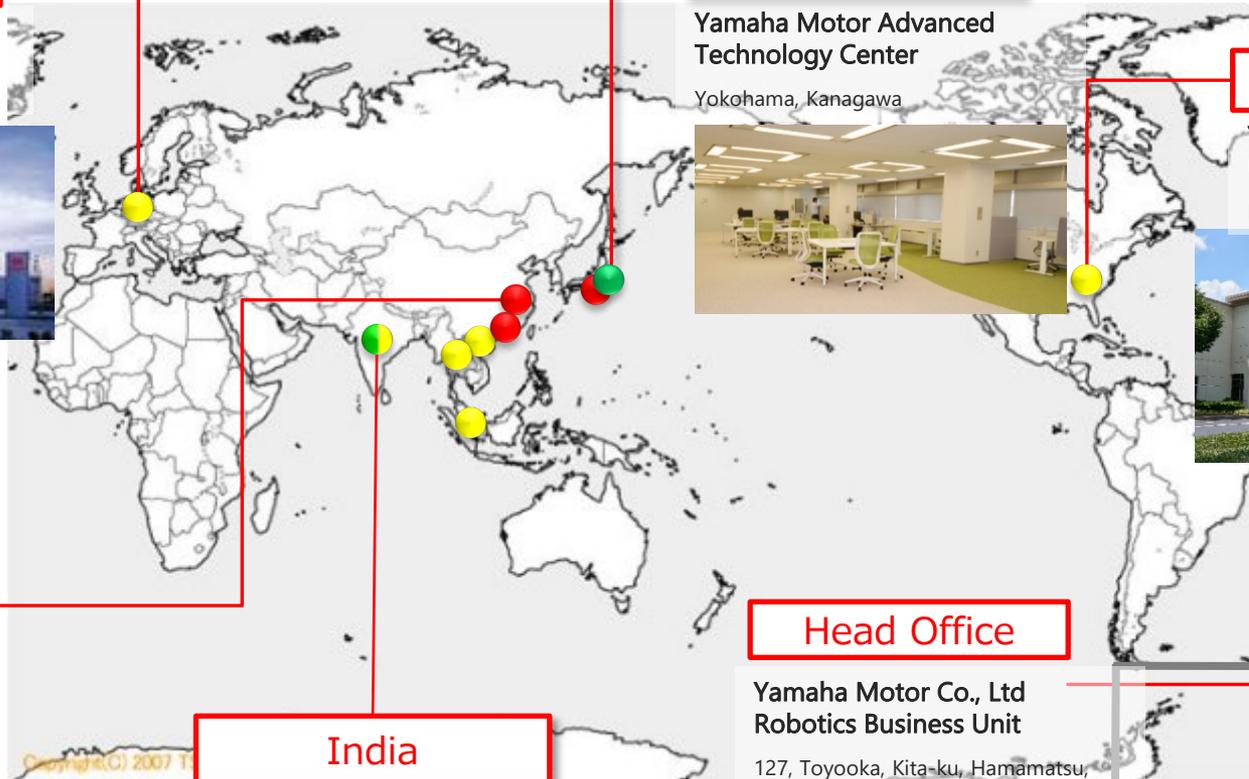Suzhou, Jiangsu

India

Yamaha Motor India Pvt. Ltd

Head Office

Yamaha Motor Co., Ltd Robotics Business Unit

127, Toyooka, Kita-ku, Hamamatsu, Shizuoka 433-8103, Japan

Robotics Business Products

SMT Systems

FA Industrial Robots

SEMI
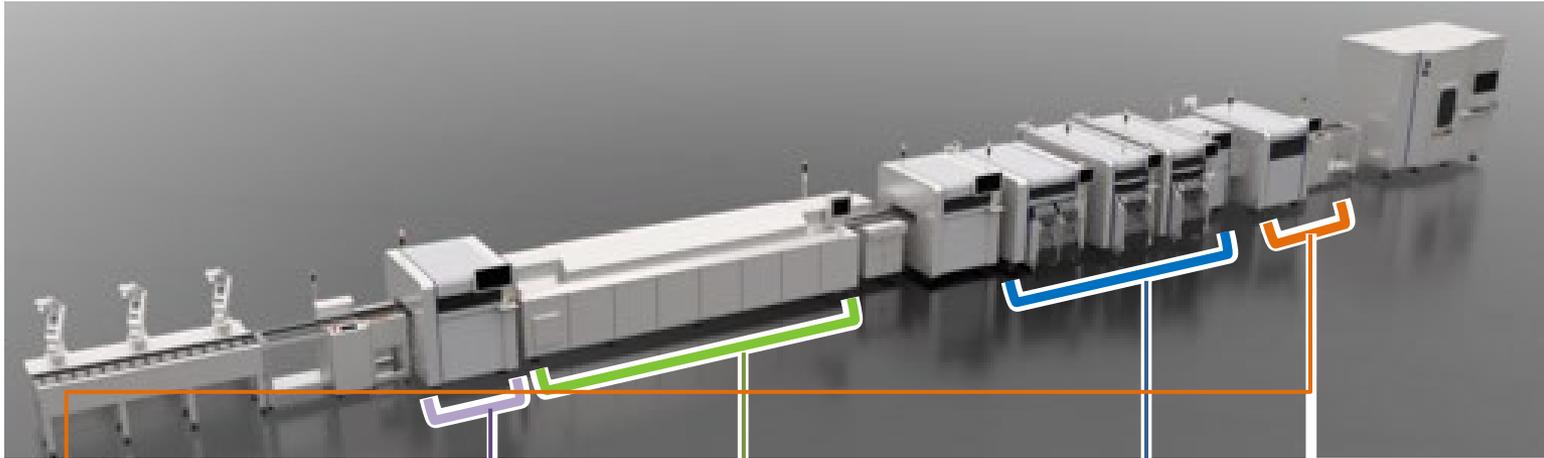### Semiconductor Manufacturing Systems

UMS
Unmanned Systems

Yamaha One-Stop Smart Solution

AOI

Surface Mounter

SPI

Dispenser

Solder-Paste Printer

Large/ Odd-shaped Part Compatibility

Flip Chip Bonder

SMD Storage System

Feeder

Software

IoT/M2M Integration system
Intelligent Factory

Creating a PCB in Surface Mounting

Four main processes of the SMT line

1. Printing

Print solder paste on the circuit board

2. Mounting

Mount components on the solder
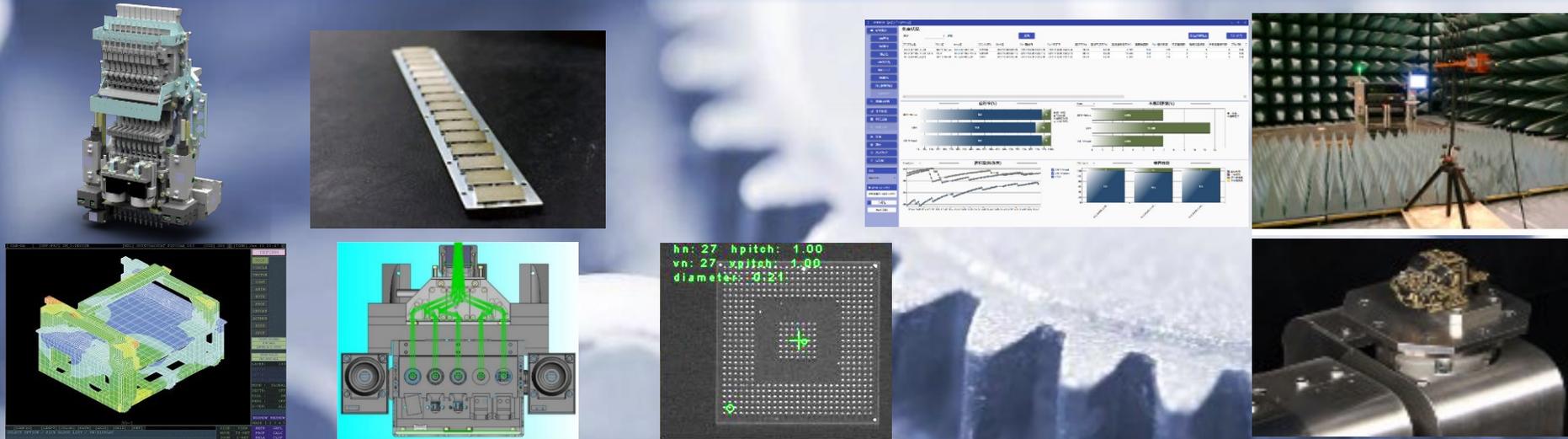
3. Reflow

Melt the solder with heat and cool to harden

4. Inspection

Check if the circuit board was made correctly

The Core Technologies in Yamaha SMT Systems

Deliver high performance, cost competitiveness, and flexibility for client needs through in-house development of core technologies optimized for SMT processes

Designing precision mechanisms with high durability and reliability

High-speed, high-precision motor design and servo control

Optical design and image processing systems

Production line optimization Peripheral management systems IoT/AI

Responding to individual client needs

SMT process technologies and analysis/evaluation technologies (Printing, Coating, Mounting, Reflow/Cooling, Inspection)

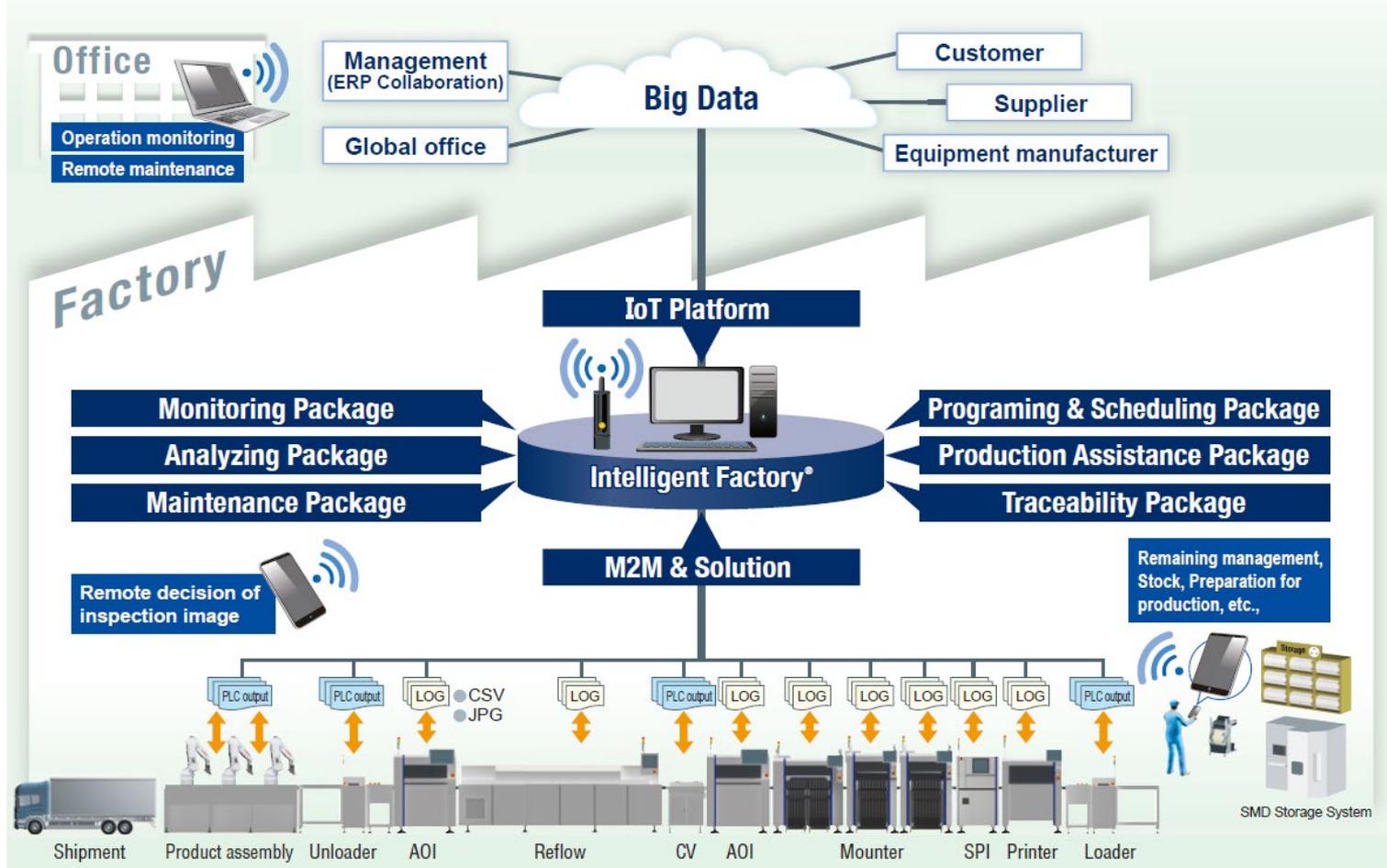# SMT IoT/M2M Solution by "Intelligent Factory"

1. Toward Zero Defects
- Predictive maintenance for equipment
- Process monitoring and analysis
- Total inspection and traceability

2. Achieve Unmanned Operation
- Automatic material supply
- Automatic changeover

3. Continuous Production
- Remote maintenance work
- Automatic maintenance

Robotics Business Products

SMT Systems

FA Industrial Robots

SEMI
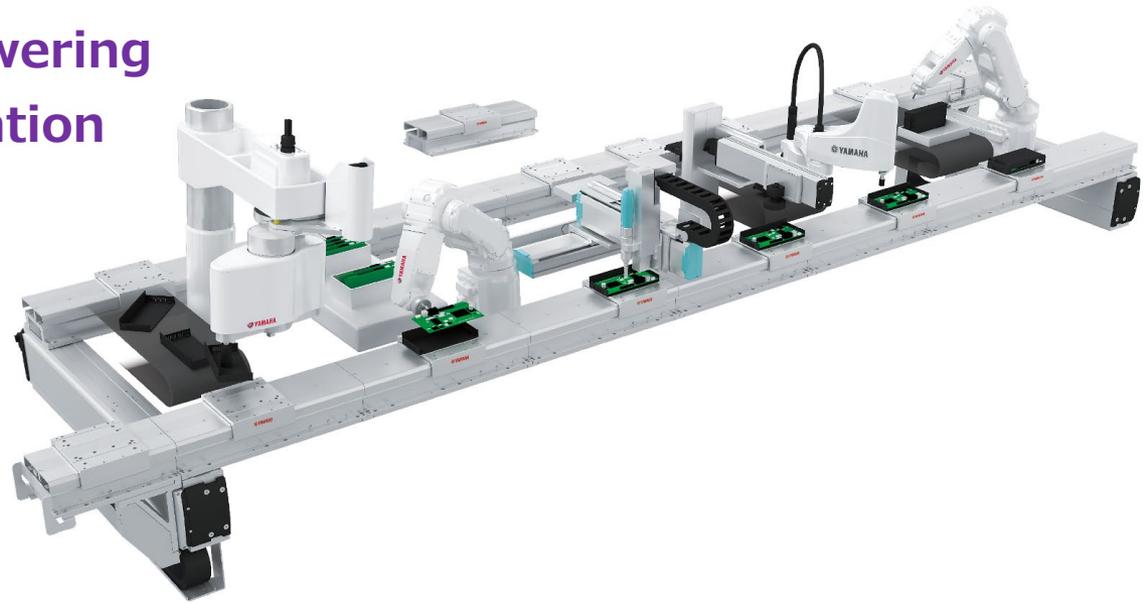### Semiconductor Manufacturing Systems

UMS
Unmanned Systems

Yamaha Factory Automation: Total Solutions

Extensive lineup answering various client automation needs
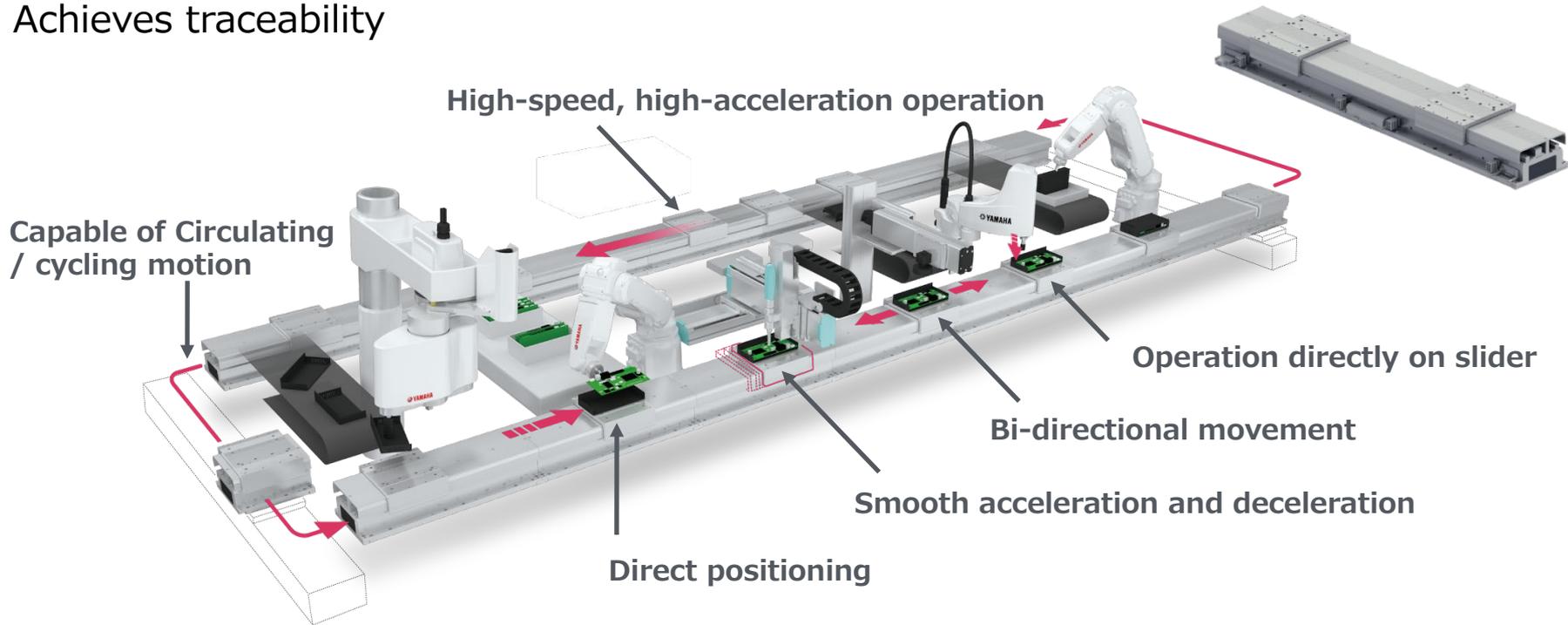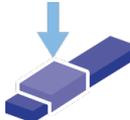

Wide Range

7-Axis

Collaborative robot

Yamaha Factory Automation: Linear Conveyor Overview

What improvements does the LCM bring?

- Raises the productivity of equipment (acceleration and maximum speed)
- Raises investment efficiency
  (space-saving design, tasks can be performed directly on the slider)
- Achieves traceability

High-speed, high-acceleration operation

Capable of Circulating / cycling motion

Operation directly on slider

Bi-directional movement

Smooth acceleration and deceleration

Direct positioning

	Maximum speed		Stopping accuracy		Maximum payload
	2500mm/s		**±5**μm		**15**kg

Yamaha Factory Automation: SCARA Robots

Clients can select models best-suited to each assembly process

- **Compact**

  Can be installed in small spaces

- **High-speed operation**

  Much faster than cartesian robots

- **Low cost**

  Lower cost than cartesian or articulated robots

- **High precision**

  Positioning repeatability ±0.01 mm

Orbit type

Wall-mount/Inverse
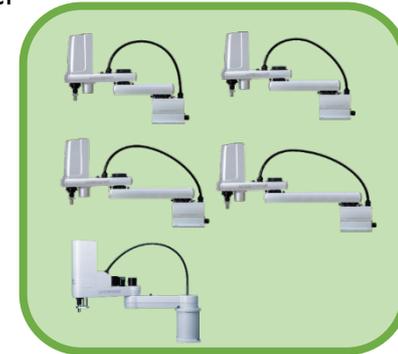
Tiny type

Small type

Clean model

Dust-proof/Drip-proof model

Medium type

Large type

Robotics Business Products

SMT Systems

FA   Industrial Robots

SEMI
Semiconductor Manufacturing Systems

UMS
Unmanned Systems

Yamaha Robotics Holdings Company Structure

YAMAHA MOTOR
Yamaha Motor Co., Ltd.

YAMAHA ROBOTICS HOLDINGS
Yamaha Robotics Holdings Co., Ltd.

Established on July 1, 2019

*Yamaha Motor Robotics Holdings Co., Ltd. changed its corporate name to Yamaha Robotics Holdings Co., Ltd. on Jan. 1, 2021.
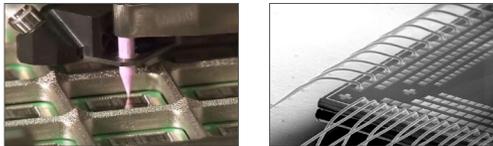
Founded
August 6, 1959
Company name changed from Shinkawa Ltd. on July 1, 2019

Headquarters
21st floor, New Pier Takeshiba South Tower 1-16-1 Kaigan, Minato-ku, Tokyo 105-0022 Japan

---

SHINKAWA LTD.

Connects the latest semiconductors with its bonding technology
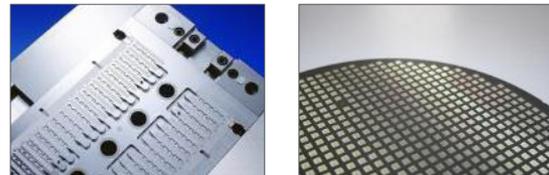
➢ **Die bonders**
➢ **Wire bonders**
➢ **Flip chip bonders**

Manufactures and sells semiconductor manufacturing equipment, such as die bonders, wire bonders and flip chip bonders

Bases: Musashimurayama, Tokyo and Hamamatsu, Shizuoka Pref.

YAMADA
**APIC YAMADA CORPORATION**

Top share in FOWLP molds

➢ **Molding equipment and molds**
➢ **Lead machining devices and molds**
➢ **Lead frame Parts**

Manufactures and sells semiconductor manufacturing equipment, such as molds and lead machining devices as well as molds and ultrahigh precision lead frame parts

Base: Chikuma, Nagano Pref.

PFA
PFA Corporation

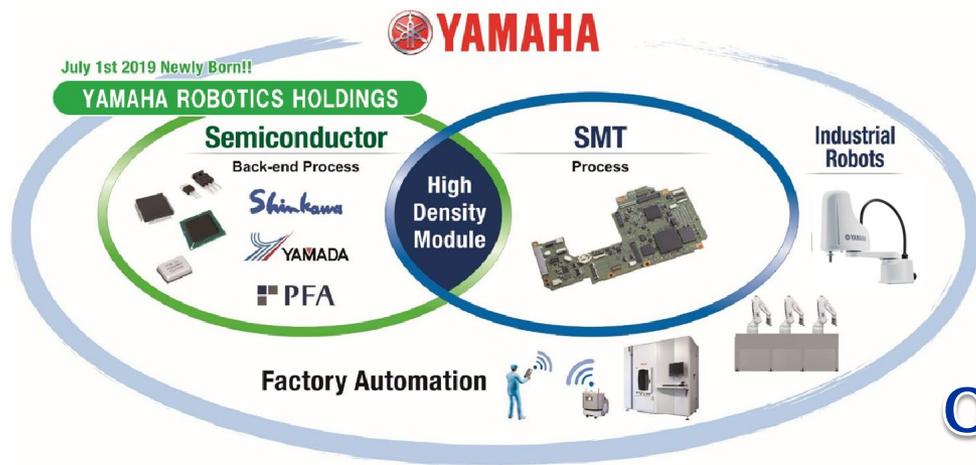**Creates a wide range of FA equipment for semiconductor manufacturing**
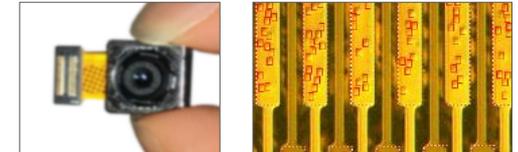
➢ **Various FA equipment**
Camera modules, flat panel displays, and crystal devices, etc.

Assembles cameras, crystal devices, flat panel displays, etc., and manufactures and sells various manufacturing equipment for mounting and inspection

Base: Sakado, Saitama Pref.

Yamaha Group Turnkey Solution

Links the SMT market with semiconductor back-end processes to offer new solutions

▼

One-Stop Smart Solution

▼

Integration with robotics brings automation, streamlining, and unmanned operation to processes
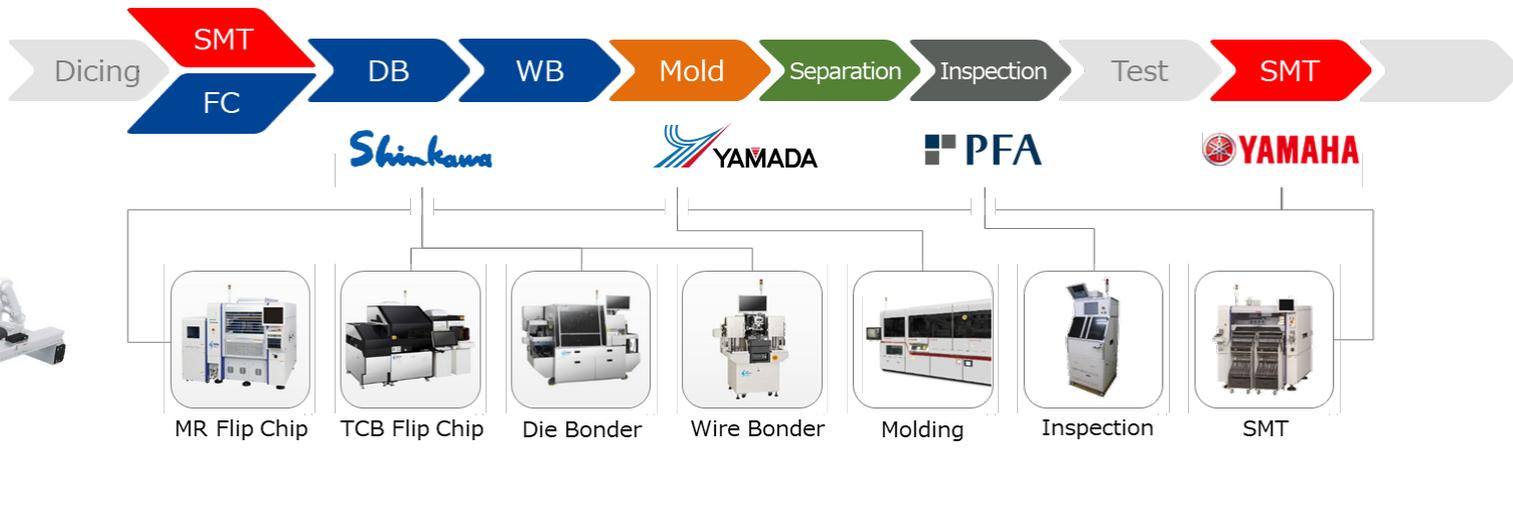
Dicing	SMT / FC	DB	WB	Mold	Separation	Inspection	Test	SMT

Shinkawa | YAMADA | PFA | YAMAHA

MR Flip Chip	TCB Flip Chip	Die Bonder	Wire Bonder	Molding	Inspection	SMT

Robotics Business Products

SMT Systems

FA Industrial Robots

SEMI
Semiconductor Manufacturing Systems

UMS
Unmanned Systems

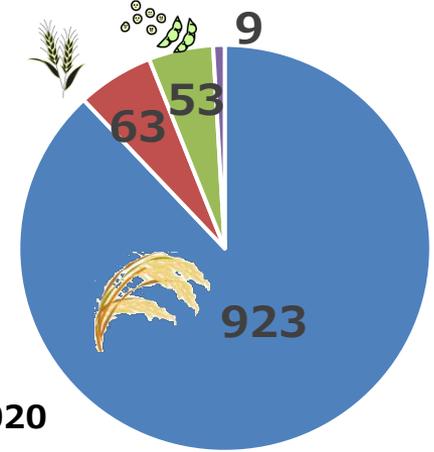# UMS Business Over the Years: Becoming a vital part of Japanese agriculture

1M hectares of farms sprayed annually

2020 Spray Area by Crop (k ha)

- Rice
- Wheat
- Soy-beans
- Others

63 | 53 | 9 | 923

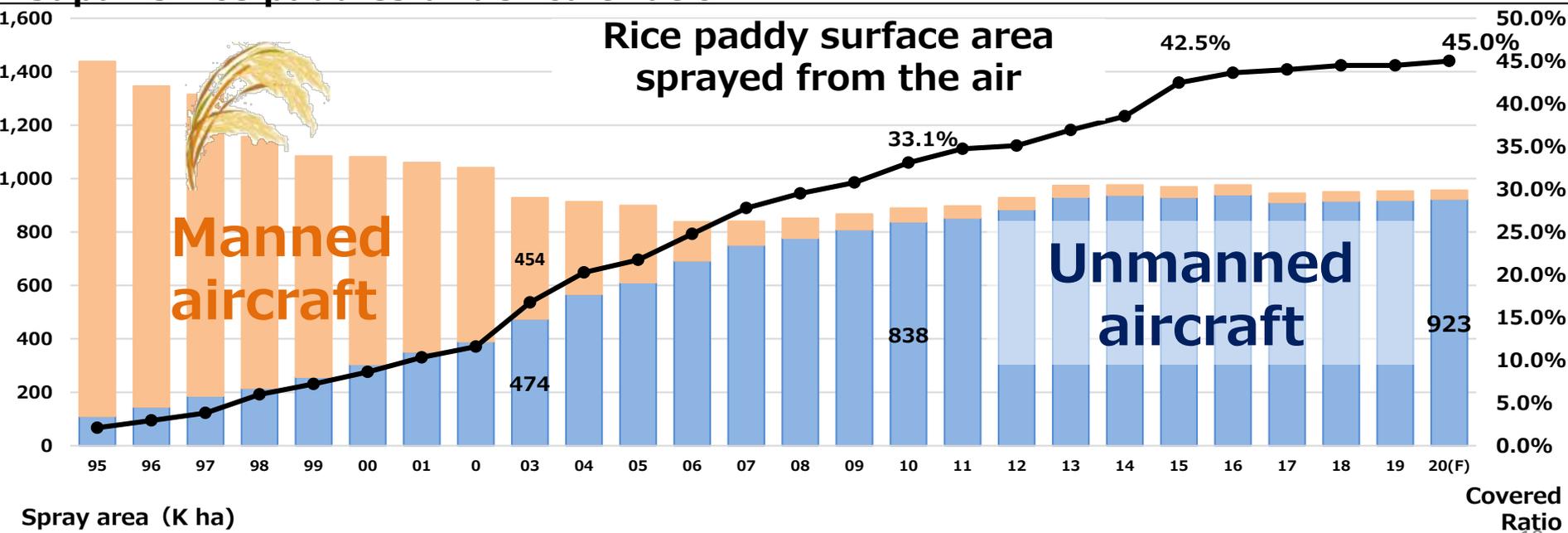**1.049 million hectares sprayed nationally in 2020**

Unmanned aircraft have largely replaced manned aircraft, now spraying 45% of Japan's rice paddies under cultivation

Rice paddy surface area sprayed from the air

Manned aircraft

Unmanned aircraft

454
474
33.1%
838
42.5%
45.0%
923

Spray area (K ha)

Covered Ratio

95 96 97 98 99 00 01 0 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20(F)

UMS Business: New Agri-Products and Solutions

Drone
+
IoT

YMR-08
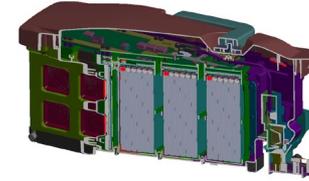
Smart Agriculture Support
Spray management system-Field management-Growth survey

Selection of unmanned helicopter or drone by application

→ **Spray data**
→ **Spray conditions, etc.**

Other spray info ←
Resource adjustments ←
Growth survey ←

WiFi
Bluetooth

Internet

What's Ahead for the Robotics Business

Fields Targeted by the Robotics Business

■ Four priority areas to tackle over the medium- to long-term

Products and Services		Existing	New
	New	Optimization of the entire factory	Entering new business areas
	Existing	Strengthening solutions	Automation in new fields

Labor-Saving and Autonomization

Market and Clients
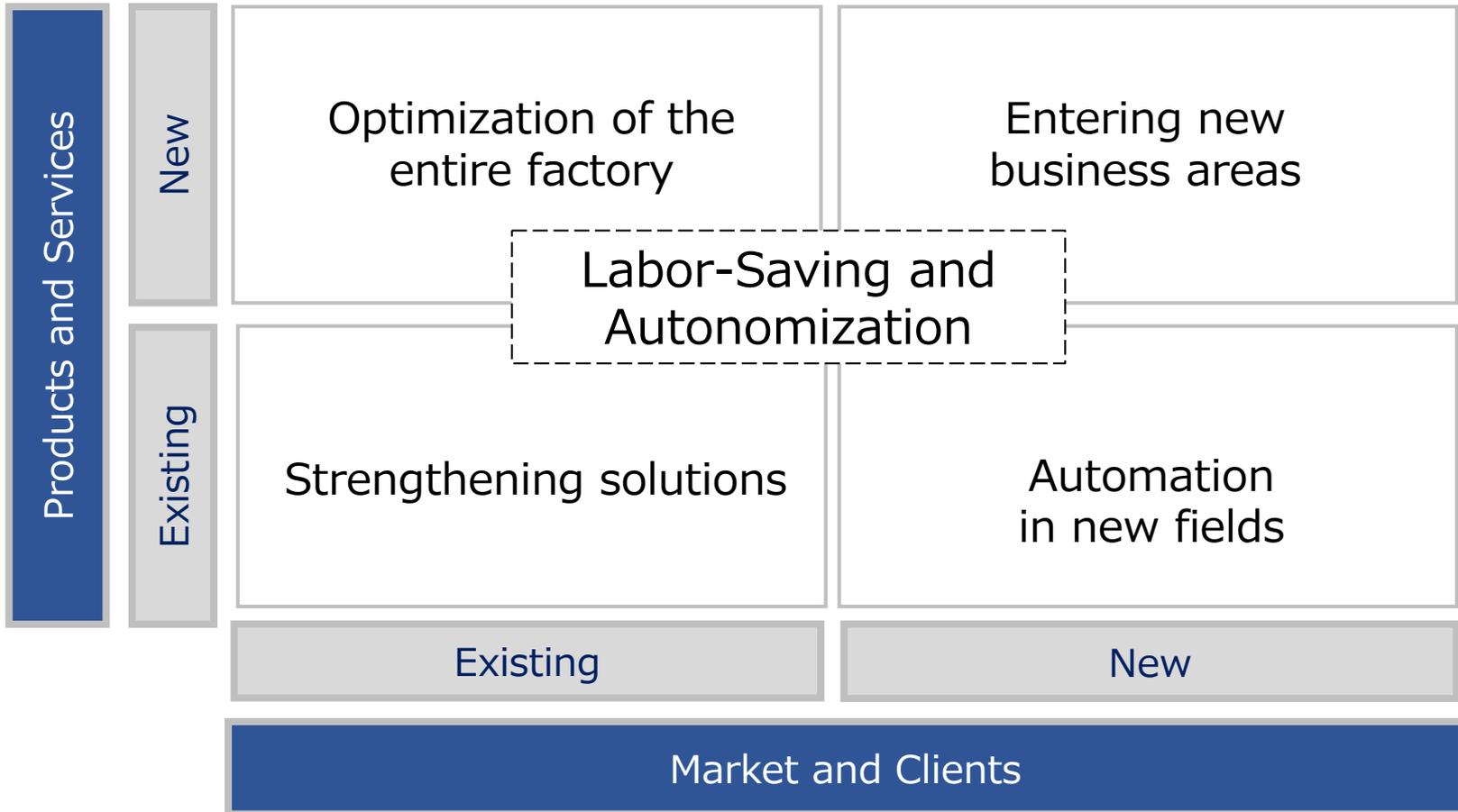
Optimization of the Entire Factory

➤ **Challenges**
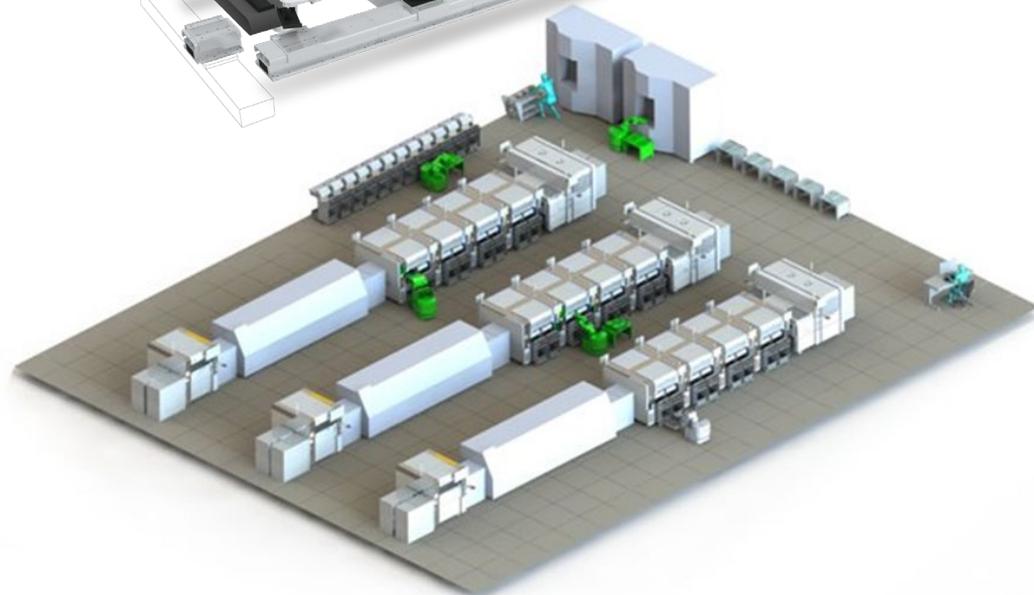Maintaining/improving productivity
Soaring labor costs
Passing on know-how

➤ **Solution**
Use labor saving and autonomization to create factories with lines that do not stop or produce defects

Products & Services	New	**Optimization of the entire factory**	Entering new business areas
		Labor-Saving and Autonomization	
	Existing	Strengthening solutions	Automation in new fields
		Existing	New
		Market and Clients	
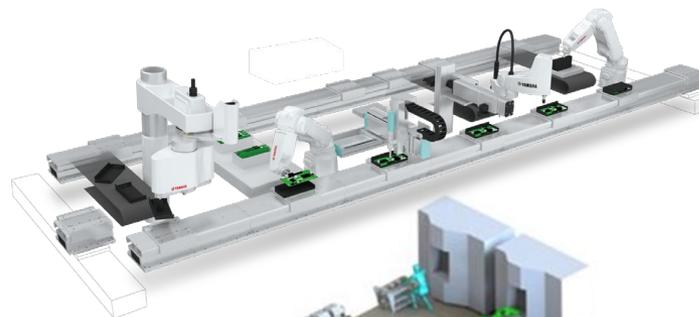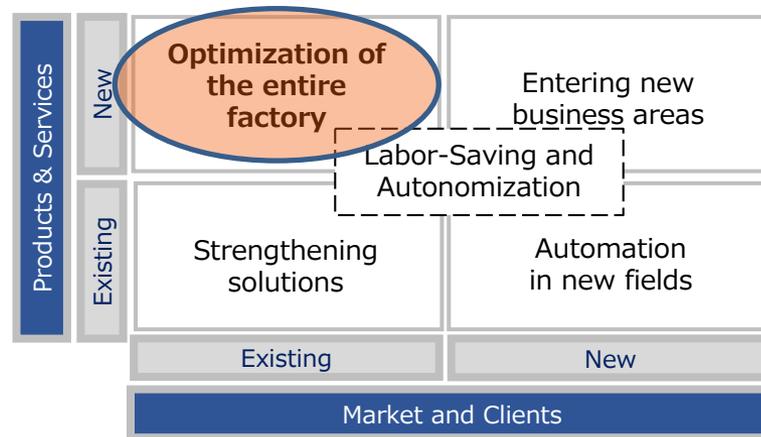
Automation in New Fields
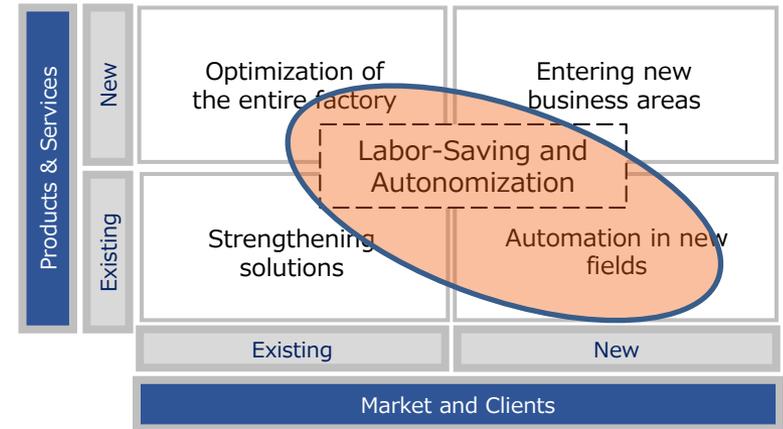
■ FA Business

➤ Entry into the rapidly growing collaborative robot industry

➤ Automation of low-value, high-stress tasks performed by people

■ UMS Business

➤ Develop a compact drone for aerial photography

➤ Development new businesses: Overseas agriculture operations, forest measure ment, and logistics

Entering New Business Areas

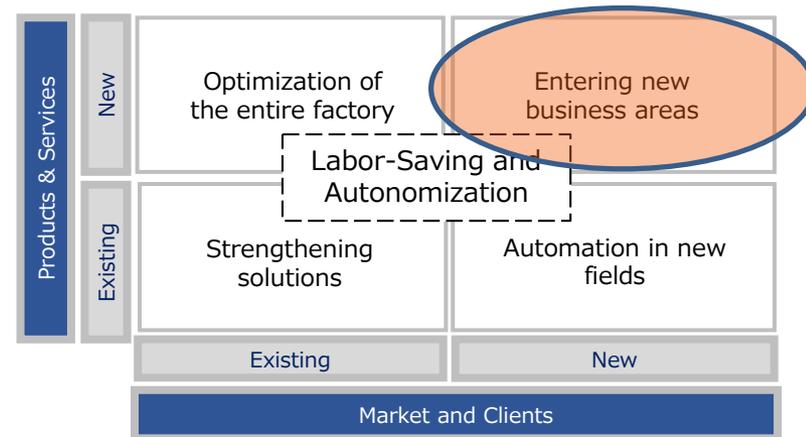| Products & Services	New	Optimization of the entire factory	Entering new business areas
		Labor-Saving and Autonomization	
	Existing	Strengthening solutions	Automation in new fields
		Existing	New

Market and Clients

■ Agriculture

➢ Invested in Robotics Plus Ltd.
Automation of harvesting and crop packing

➢ Collaboration with The Yield Technology Solutions Pty Ltd.
Efficiency improvement by forecasting grape yield and forecasting meteorological data

■ Medicine/pharmaceuticals

➢ Automation of manual cell handling

Cell picking & imaging system
CELL HANDLER™
細胞研究を新たなステージへ

Organoid Spheroid　Ex vivo　Single cell

Source; Robotics Plus Ltd.

Source; Yield Technology Solutions pty Ltd.

Strengthening Solutions and *Monozukuri*

■ **Mounter platform model development**

➢ **Aggregate models with platform strategies**

Products & Services	New	Optimization of the entire factory	Entering new business areas
		Labor-Saving and Autonomization	
	Existing	Strengthening solutions	Automation in new fields
		Existing	New
Market and Clients			

Model A →
Model B → ZPF A
Model C →

Model D →
Model E → ZPF B →

Model F →
Model G → ZPF C

Announced in 2020

YRM20
High-speed,
multi-functional
platform