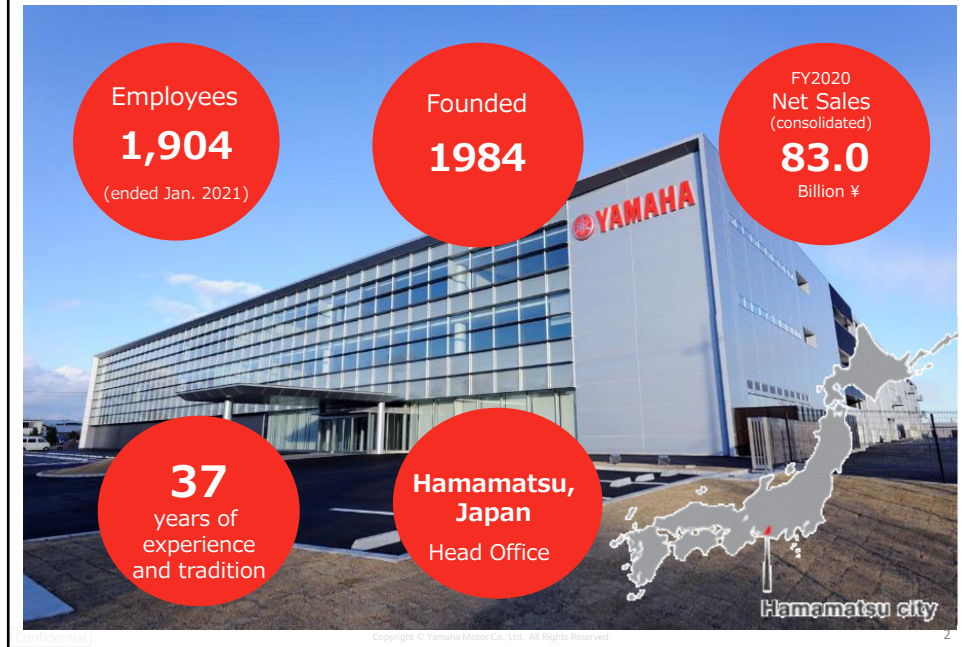


Hello everyone and thank you all for making the time to attend today's presentation.

My name is OTA, Hiroyuki and I serve as the Chief General Manager of Yamaha Motor's Solution Business Operations.

Today's presentation will provide a general overview of our Robotics business as well as the products we offer.

## Robotics Business Unit - Overview

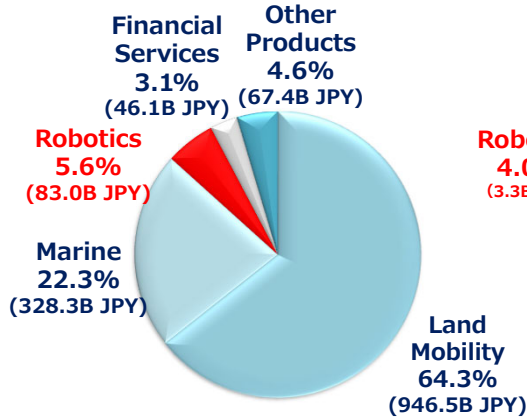


Yamaha first launched its Robotics business in 1984, and in the time since, we have grown to the scale you see here. Our head office is located in the city of Hamamatsu in Shizuoka Prefecture.

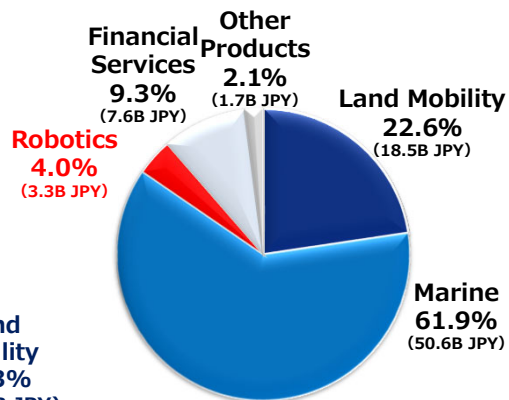
## 2020 Sales Profile (Consolidated)

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

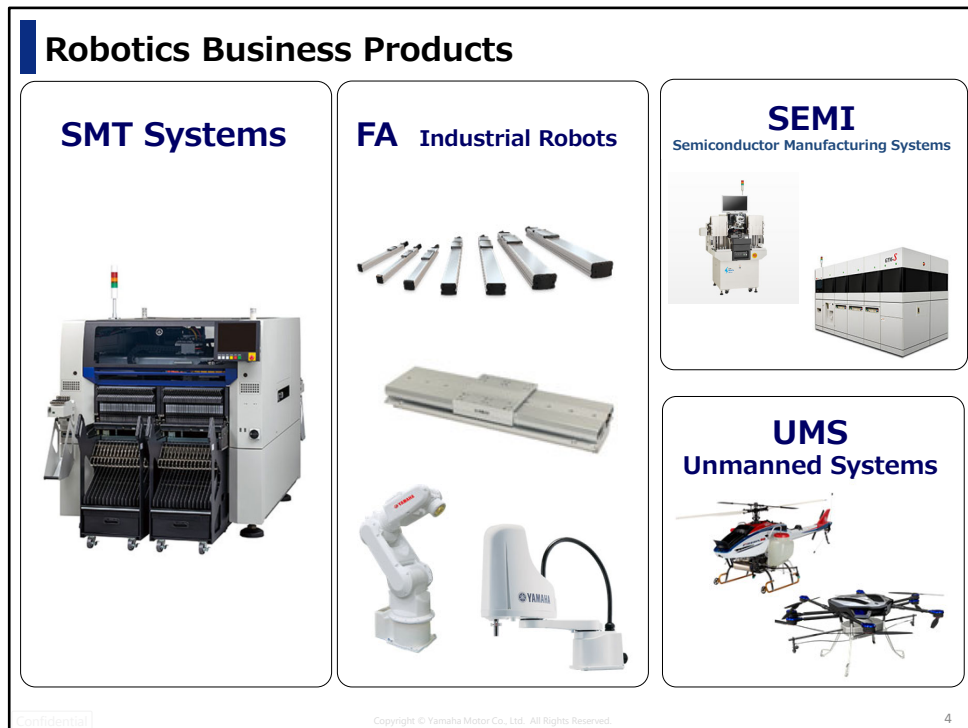
### Net Sales



### Operating Income



These charts show where the Robotics business fits in among Yamaha’s overall sales and income. We are continuing to grow and are on track to become the third pillar of the company’s operations after the Land Mobility and Marine Product businesses. While our sales still comprise just over 5% overall, our contribution to Yamaha’s companywide earnings is higher than average. However, Yamaha Robotics Holdings is currently undergoing a corporate restructuring, so the numbers are somewhat lower than what we can expect.



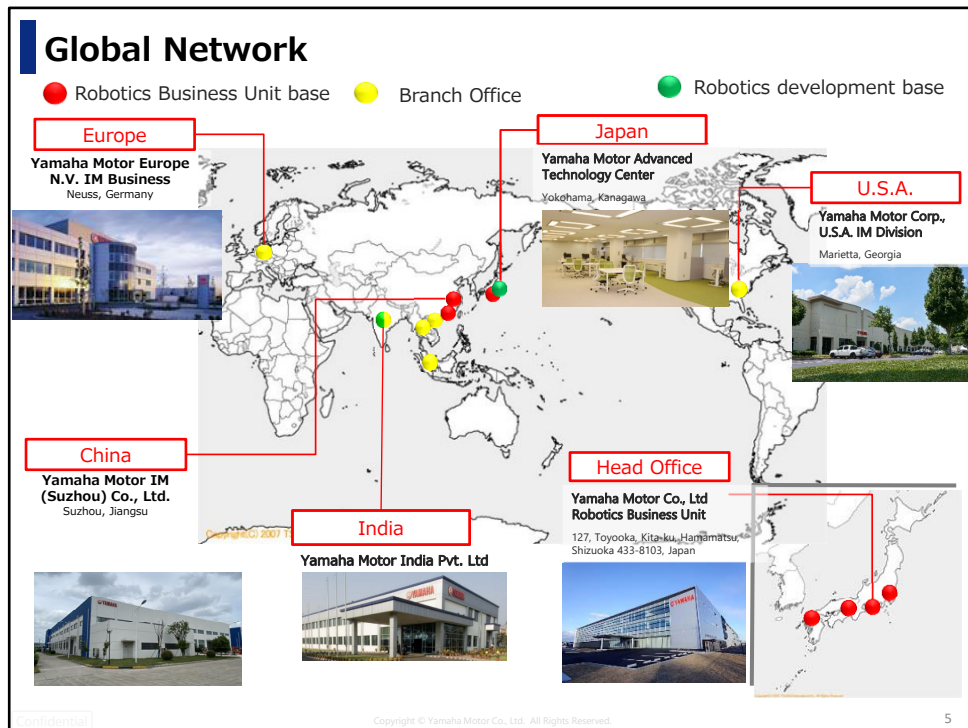
Products in the Robotics business can be largely divided into four categories.

The SMT (Surface Mount Technology) business handles surface mounters etc., and these machines automatically mount electronic components onto the surface of PCBs. I will briefly explain the process itself in a little more detail later.

The FA (Factory Automation) business focuses on industrial robots and is responsible for helping automate production operations at factories.

Our SEMI business is a recent development and requires some background information. In July 2019, we merged the operations of three industry specialists under Robotics Business Unit: Shinkawa, which handles bonding equipment for semiconductor back-end processes, Apic Yamada, which specializes in molding for semiconductor package, and PFA, which creates a wide range of factory automation equipment for semiconductor manufacturing. These three were brought together as Yamaha Robotics Holdings. This enables us to offer total solutions for SMT processes, semiconductor back-end processing, and factory automation.

Lastly, the UMS (Unmanned Systems) business manufactures and sells unmanned industrial-use helicopters and drones. All of our businesses run all-inclusive operations, conducting their own development and manufacturing to sales and after-sales service and support.



This slide shows the global network we have in place. In Japan, we have the headquarters in Hamamatsu and three other domestic offices in Saitama, Osaka, and Fukuoka prefectures. Overseas, we have a subsidiary with two location in China and offices in both Europe and the United States. In addition, we have sales and service offices in Thailand and Vietnam. Further, we have engineering offices in Yokohama, India and Europe. In this way, we strive to keep close to our clients and listen directly to their issues and input in order to offer solutions faster.

## Robotics Business Products

### SMT Systems



### FA Industrial Robots



### SEMI

Semiconductor Manufacturing Systems

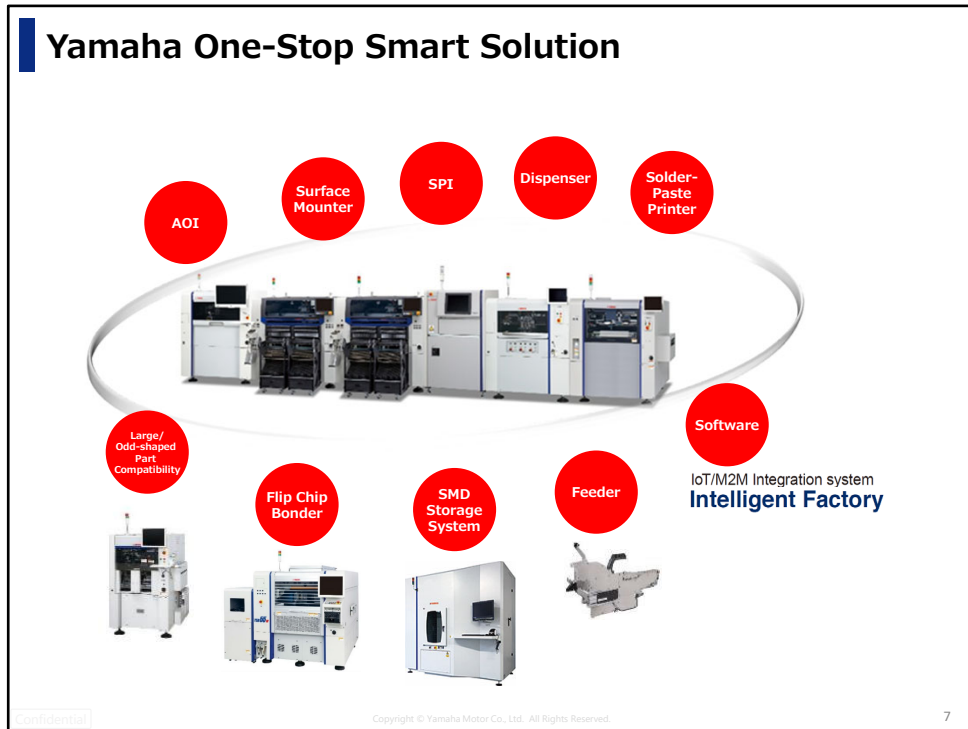


### UMS

Unmanned Manufacturing Systems



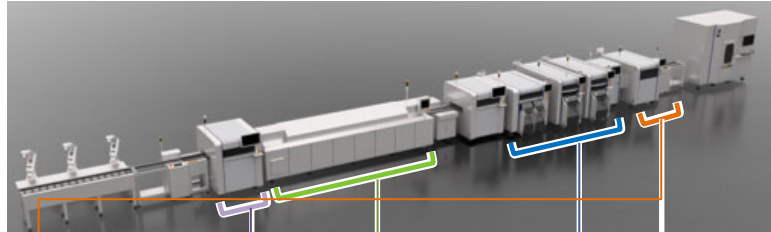
Next, I will go into what our SMT business is about.



We develop and manufacture in-house all of the machinery we offer clients, from solder-paste printers and dispensers to surface mounters and automated optical inspection machines. We are the only company in the industry that builds equipment for all of the main processes on an SMT line, and one of our biggest strengths is being able to propose complete all-lines. Also, developing all the primary equipment required for a line ourselves is aiding in our work to create an Intelligent Factory that removes the need for human intervention as much as possible.

## 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

Here, I will briefly introduce the four main processes involved with an SMT production line. The first is to “print” solder paste onto the printed circuit board (PCB) for electrically connecting the electronic components to it. This happens in the second step, where said electronic components are “mounted” on top of the solder paste printed onto PCB. What comes next is a step called “reflow” in which heat is applied to the entire PCB to melt the solder and then cool it to harden it, thereby connecting the electronic components to the board itself. The last part of the process is inspecting the finished PCB to check if it has been manufactured properly. If there are no problems, then the board is deemed complete.



## 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)**

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As I mentioned before, one of our strengths is that we can propose total solutions that cover all of the main processes in an SMT line, but another strength we have is the in-house development of our core technologies. This not only enables us to make such proposals, but also means we can quickly incorporate customer feedback into our products. Developing everything in-house allows us to provide performance optimized for SMT operations at a cost not feasible with commercially available general-purpose equipment. It also means we can get rid of black boxes, giving us added flexibility for responding to client needs.

## SMT IoT/M2M Solution by “Intelligent Factory”

### 1. Toward Zero Defects

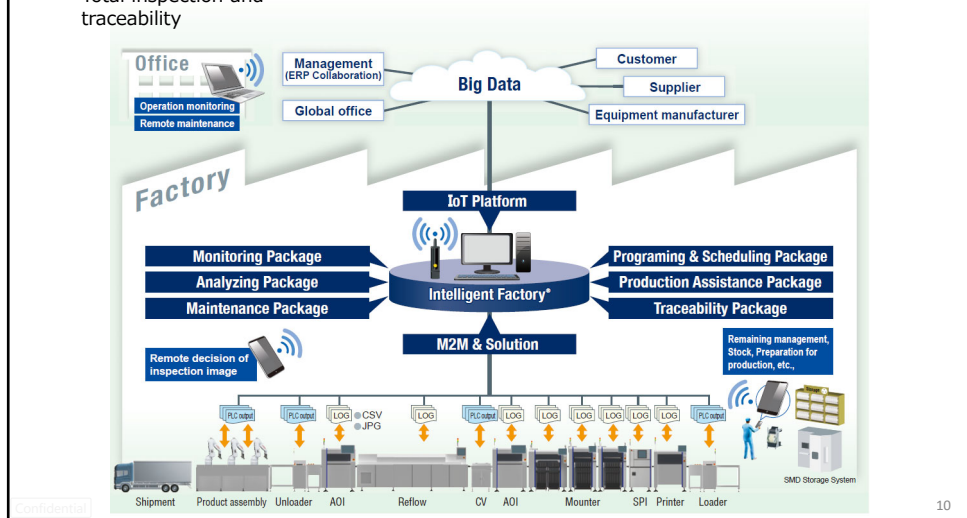
- Predictive maintenance for equipment
- Process monitoring and analysis
- Total inspection and traceability

### 2. Achieve Unmanned Operation

- Automatic material supply
- Automatic changeover

### 3. Continuous Production

- Remote maintenance work
- Automatic maintenance



Of course, we do not just offer mainstay equipment for the SMT industry. We provide clients with further added value with facilitative machine-to-machine connections. Specifically, we are working every day toward creating an all-inclusive solution for lines that detect fluctuations in quality and prevent defects from occurring in advance, can operate unmanned and require minimal human intervention, and most important of all, maintain production without stopping.

## Robotics Business Products

### SMT Systems



### FA Industrial Robots



### SEMI

Semiconductor Manufacturing Systems



### UMS Unmanned Systems

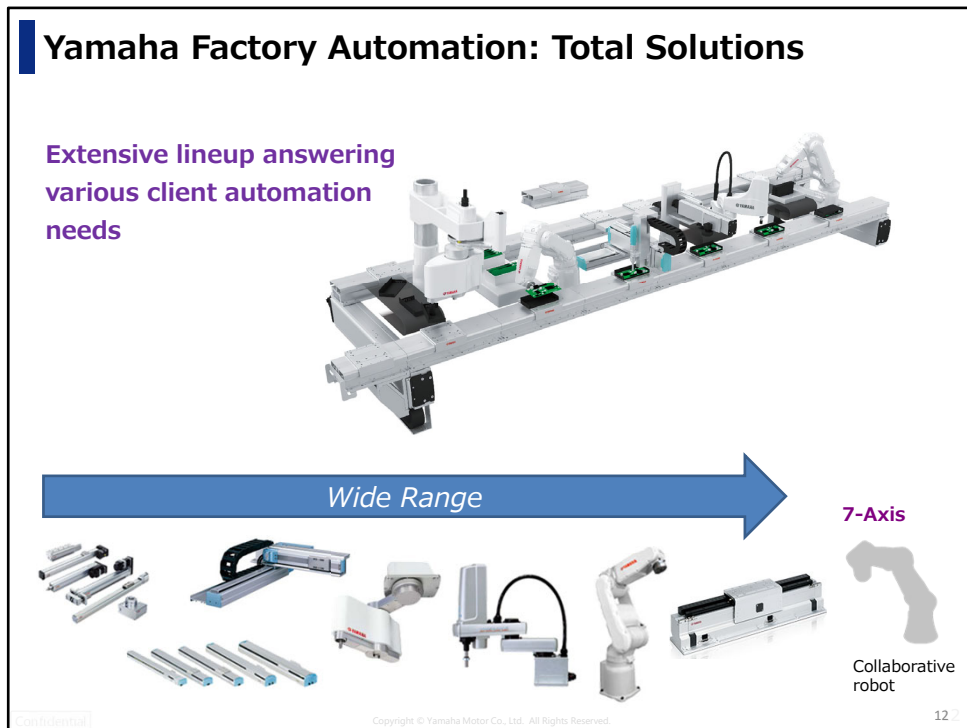


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Moving on, next is our FA business.



Industrial robots are used at the manufacturing sites of various industries and are indispensable products that support our lives and lifestyles today. For example, these robots are at work in the factories manufacturing the power control units that govern the power directed to the engines, motors, and onboard navigation devices found in cars. In the electronics industry, robots are helping build smartphones as well as the camera modules, battery packs, and liquid crystal displays they use. And today, the industry is beginning to branch out, with industrial robots seeing greater use in fields like the food, medical, and cosmetics industries, which previously did not employ robots as extensively as the mainstay automotive and electronics sectors. In the food industry, they handle tasks like boxing and labeling, while in the healthcare sector, robots are at work packing medicines by type and amounts specific to each patient as well as manufacturing syringes. With the cosmetics industry, such robots are utilized in the manufacture of makeup containers as well as cheek blush and eye shadow.

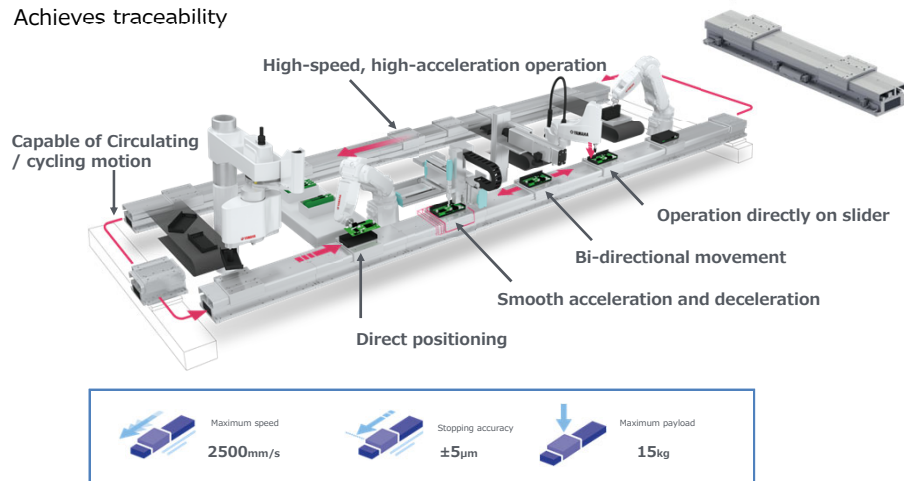
There are robots suited to each production process in these industries, and we offer a wide-ranging lineup of industrial robots that meet the needs of production lines creating smaller sized products.

This lineup includes actuators and single-axis robots used for transporting parts; SCARA robots that raise production volume with their high-speed operation and save on equipment space to improve overall productivity; linear conveyor modules that dramatically boost the productivity of automated lines by transporting products in-between assembly processes at high speed; cartesian robots ideal for tightening screws and sealing processes; and articulated robots capable of complex operations.

## 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



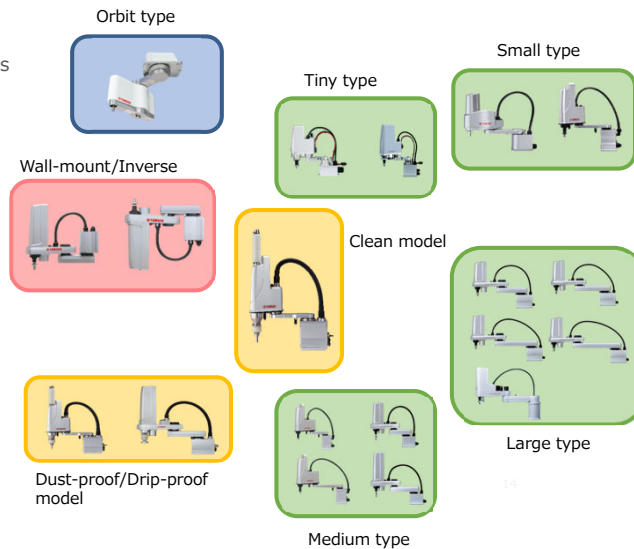
Among this diverse lineup, our linear conveyor module has been receiving particular praise recently. This system is capable of high-speed transfers and high-accuracy positioning, and has been applauded for delivering a 23% increase in productivity among other achievements. It also saves factory floor space and contributes to greater traceability. I would also like to note that in April this year, the LCMR200 model you see here won Germany's internationally prestigious iF Design Award and Red Dot Award. Of course, these awards give marks for exterior design quality, but not only that. I understand that the judging takes on a much broader perspective and covers everything from what problem an entry solves and its functionality to how innovative it is, what sets it apart from the competition, and how much it contributes to the brand and society.

I believe with the LCM series, the two awards recognized how it improves productivity by shortening transfer time, lowering resource use and saving factory floor space, and how its modular design simplifies line setup, shortens line construction time, and reduces the number of tasks in line assembly.

## 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  $\pm 0.01$  mm



In addition, our SCARA robots play a key role in assembly and other factory operations. They feature compact size, high speed, low cost, and high accuracy, and we offer an industry-leading lineup that sees use across a wide range of applications.

In recent years, some of the most common uses for these robots are in the manufacture of solar panels, batteries, and cosmetics boxes.

Yamaha's advantage in having so many robots in the lineup is being able to make across-the-board proposals for such processes, not just pairing our SCARA robots with linear conveyor modules, but also with our single-axis, cartesian, and articulated robots.

## Robotics Business Products

### SMT Systems



### FA Industrial Robots



### SEMI

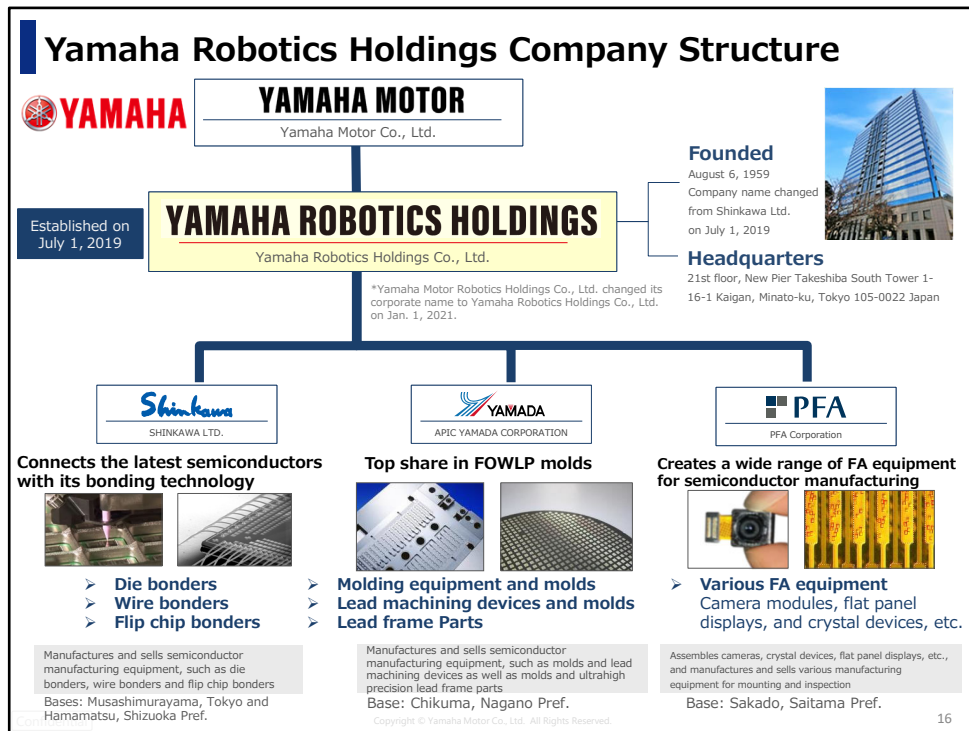
Semiconductor Manufacturing Systems



### UMS Unmanned Systems



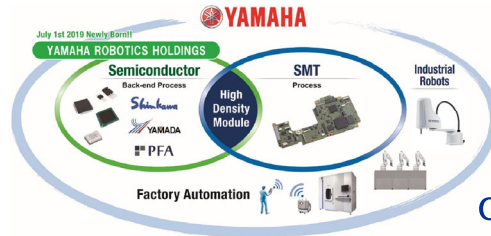
In this next section, I will explain our semiconductor manufacturing system.



Yamaha Robotics Holdings became a Yamaha Motor subsidiary in 2019 and offers devices and equipment for the back-end processes in semiconductor manufacturing. Shinkawa is a manufacturer of wafer bonding equipment used for attaching wafer chips to substrates to establish conductivity. Apic Yamada is a manufacturer of molding equipment that seals resin. And PFA builds equipment for assembling the camera modules and crystal oscillators found in smartphones and other devices.



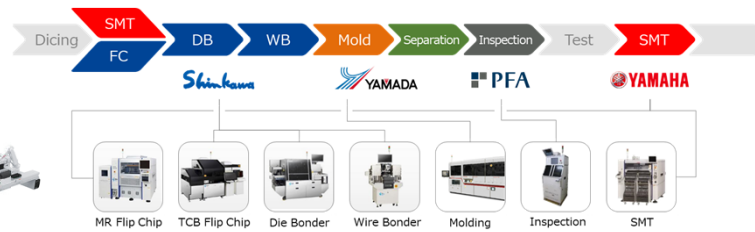
## Yamaha Group Turnkey Solution



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



To provide Yamaha One-stop Smart Solution even in the semiconductor back-end process, we are building a framework in which we can make proposals that do not only include the offerings from Shinkawa, Apic Yamada, and PFA, but also incorporate our SMT and FA products.

## Robotics Business Products

### SMT Systems



### FA Industrial Robots



### SEMI

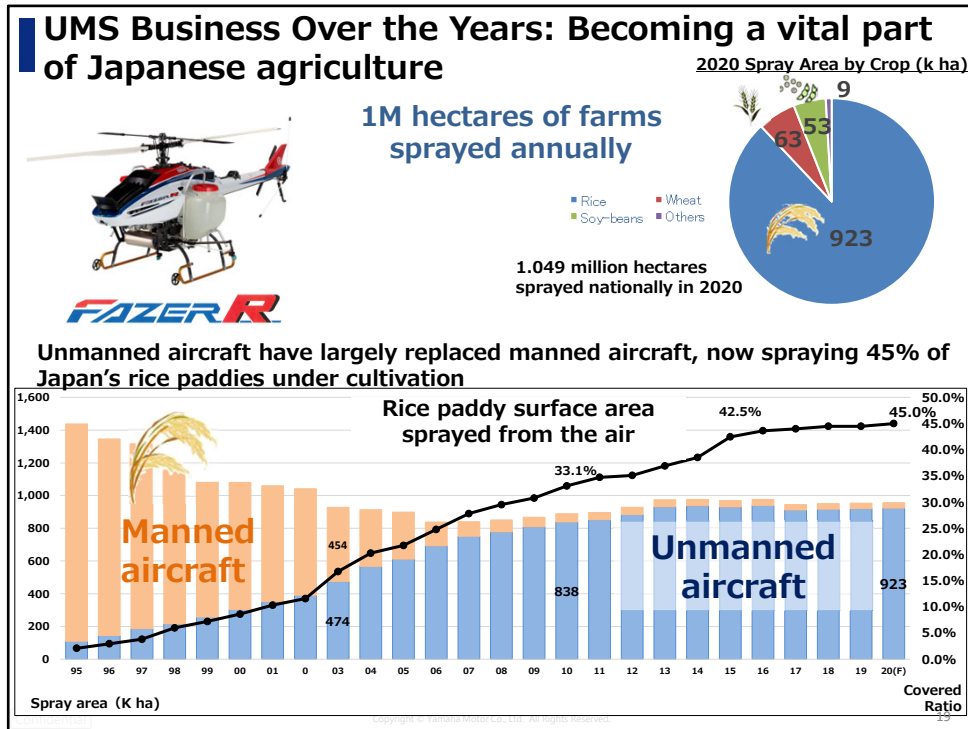
Semiconductor Manufacturing Systems



### UMS Unmanned Systems



Finally, I'd like to introduce our UMS business.



In Japan, the spraying of agrichemicals onto rice paddies under cultivation was typically done either on foot, constituting heavy labor, or using manned helicopters to perform the task from the air. However, manned helicopters had to maintain a certain altitude while dusting the paddies and this brought problems like the agrichemicals being blown into neighboring areas. Most of all, a crash could have life-threatening consequences for both pilots and people on the ground. So, we developed and brought unmanned helicopters to the market and their ability to spray fields at low altitudes saw them gradually replace manned helicopters in this domain. Today, 45% of the rice paddies in Japan are sprayed by Yamaha unmanned helicopters.

## UMS Business: New Agri-Products and Solutions

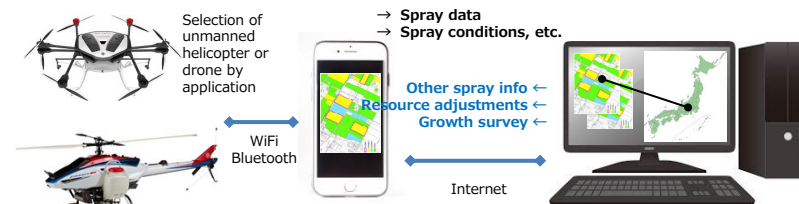


YMR-08

Drone  
+  
IoT

### Smart Agriculture Support

#### Spray management system-Field management-Growth survey

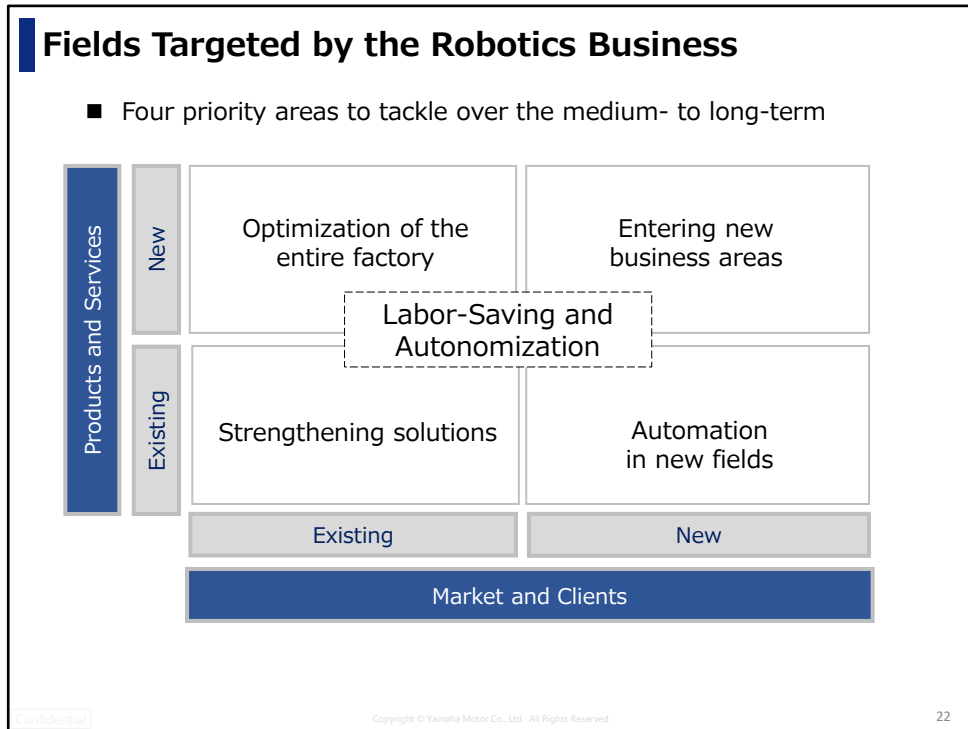


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These unmanned helicopters are best suited to spraying relatively large-scale farmland, but for smaller farms, what is commonly heard today is that electric ag drones are more efficient. To that end, we also offers its own electric ag drones that retain the spray quality we have honed with our unmanned helicopters. Furthermore, we provide total solutions in agriculture as well, and support the push toward smarter agriculture, such as devising spray plans fitting the growth stages of crops and working to efficiently manage and allocate spray-related resources.

# What's Ahead for the Robotics Business

From here on, I will talk about the future ahead for the Robotics business.



I will explain how we will use robotics to resolve societal issues using the diagram you see here. The x and y axes are divided into “new” and “existing” categories, with the vertical axis covering our products and services and the horizontal our markets and clients. We will provide solutions from here onward by utilizing robotics to help people dedicate more time and energy to tasks requiring human input and creativity.

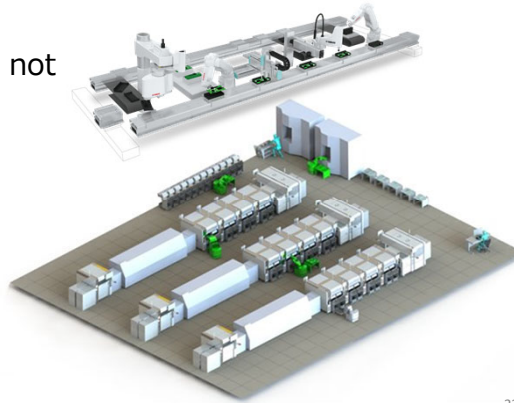
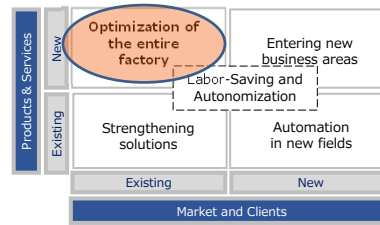
## Optimization of the Entire Factory

### ➤ Challenges

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

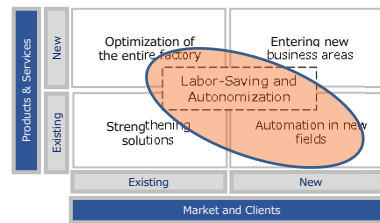
### ➤ Solution

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



Beginning from the upper left, we are looking to begin optimizing whole factories. Manufacturing worksites are facing numerous issues, such as soaring labor costs, labor shortages, difficulty in handing down experience and know-how, and the maintenance and/or improvement of productivity. To address these problems, we are aiming to create as well as help create factories that do not stop and produce no defects by reducing required labor and using autonomization. As an example, let's say the factory detects that the number of components remaining for line operations is running low. Based on that information, components from the stock house are automatically prepared and transported to the side of the line, thereby restocking it well before supply runs out. Other examples would be detecting quality fluctuations and making corrections autonomously, or creating a production plan that minimizes wasted time and maximizes throughput, or detecting a slight inconsistency in the equipment and conducting predictive maintenance measures. In short, we want to create facilities that function as if there are excellent site managers, production engineers, and maintenance engineers on-site. We also propose use of our linear conveyor modules as solutions that minimize the time spent on transfers, which is essentially wasted time, while freeing up more valuable factory floor space.

## 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

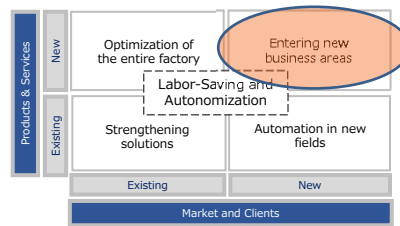
- Develop a compact drone for aerial photography
- Development new businesses: Overseas agriculture operations, forest measurement, and logistics



Now, let's move to the lower right side of the diagram. With our industrial robots in the FA business, we are developing collaborative robots, in a tie-up with Tokyo Robotics. We announced this partnership last year. Several companies have already brought them to the market, but we are aiming to offer even higher value to clients. Further, the avenues for applying our robotics know-how and technology are not limited to the walls of the factory, and we are developing small drones for photography that ensure user safety and peace of mind, as well as working to develop new businesses in areas like forest measurement and logistics.



## Entering New Business Areas



### ■ 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



Source; Robotics Plus Ltd.



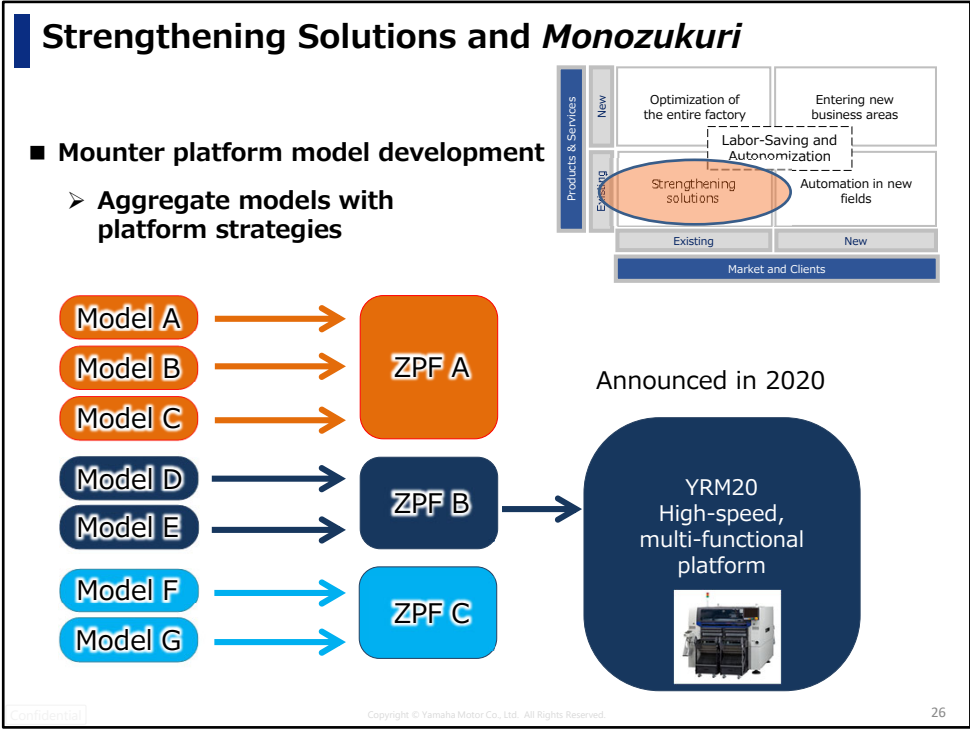
Source; Yield Technology Solutions Pty Ltd.

### ■ Medicine/pharmaceuticals

- Automation of manual cell handling



Next, we move to the area on the upper right. In automating agriculture, we invested in a company called Robotics Plus in New Zealand and are working with them to automate the process of packing apples. We are also leveraging our in-house R&D resources to try and automate the harvesting of grapes. In the medical field, we have successfully automated previously manual cell handling steps and are now working on cancer-fighting drug matching. These are all fields still ripe for future growth and we are striving to expand the opportunities available.



Lastly, we come to the lower left area. This is the core domain of our business today. The surface mounter business has a history of pursuing mergers and acquisitions, and the number of models we have is a bit much. By converting these into platforms, we aim not only to improve the efficiency of our *Monozukuri* and technical resource investments, but also to provide advantages to customers like standardized usability, shared spare parts, and shorter equipment delivery times. Last year, we announced the YRM20 as the first model in this strategy, and plan to introduce second and third platform models sharing parts and designs developed with the YRM20. By further refining our One-stop Smart Solution concept, one of our strengths, we will both expand our domains and grow our business.



Today's presentation provided a general overview of the Robotics business. I think each of them paint an image of Yamaha Motor that differs significantly from the usual view of us as a motorcycle company. However, our products originated as machine tools and employ electronic control technologies created and refined with engines, chassis and hulls of motorcycles and marine products. We provide solutions as one of Yamaha's businesses, and in that capacity, we are committed to solving societal issues by getting to the root of client problems and offering value that extends to the automation of entire factories. That brings me to the end of my presentation and thank you for your attention. If you have any questions, please raise your hands.