Strategies and Businesses

Steadily Carry Out Growth Strategies by Leveraging the Strengths of Each Business Field

Top Message

Looking beyond the COVID-19 Pandemic and Seeking Sustainable Growth in Harmony with Society

Toyota Industries will take on new challenges to ensure sustainable growth in a time of increasing uncertainty while making Group-wide, concerted efforts to minimize the impact of the COVID-19 pandemic.

Akira Onishi
President

Q Could you explain the impact of COVID-19 on Toyota Industries and its response to the pandemic?

COVID-19 is said to have a profound impact on the global economy — the largest in the post-WWII period, far greater than the impact of the global financial crisis in 2008 and comparable to the Great Depression in the 1930s. Toyota Industries also has been heavily affected by the pandemic and has implemented a range of countermeasures.

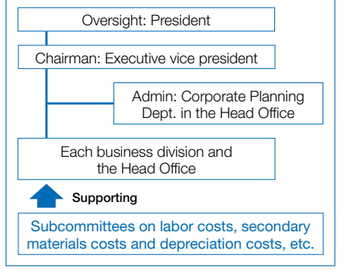
On the production and sales fronts, most of our plants around the world suspended operations for a certain period in and after February 2020. Even after lifting the suspension, some are still manufacturing at a reduced volume. For sales and after-sales service activities, customer visits have been restricted in some countries and regions. While giving due consideration to the prevention of infection, we are aiming to return business activities to normal levels.

For back office employees and engineers, we have cancelled large meetings and events and encouraged working from home and teleconferencing to reduce the risk of infection. Using this opportunity, we have been streamlining operations by examining how we hold meetings and revising and eliminating certain business processes. As a manufacturer, Toyota Industries values the concept of *genchi genbutsu* (go and see for yourself) in its operations. In the future, we will determine when to apply this concept by organizing operations into ones that continue to require *genchi genbutsu* and ones that can be done more efficiently online. Among the initiatives we are undertaking currently, we plan to carry on those that lead to work style reforms and better productivity. They have served to accelerate our rather slow efforts to improve work-life balance.

As a response to a downturn in business, we have been augmenting profit improvement activities. The plan is to substantially reduce capital investment and expenses by postponing non-urgent projects. I am spearheading a Company-wide organization encompassing various subcommittees to promote these activities. As for research and development, we will prioritize projects and carry out ones that are essential for our future growth. Anticipating a prolonged period of market instability, we have also increased cash on hand from the amount of two months to three months of consolidated net sales. At times like this, it is important to thoroughly reaffirm the basics and go back to the origin of our business. Thus, we have been stepping up our efforts to “create a workplace environment that places a top priority on safety,” “thoroughly control quality and enforce compliance” and “co-exist harmoniously with society and protect the global environment.”

Production of car air-conditioning compressors

Organization for Promoting Profit Improvement Activities



Production of lift trucks

With regard to contributing to society, we have been carrying out various support activities for medical institutions, which are becoming overburdened by the spreading virus. As an example of support for healthcare professionals utilizing our *monozukuri* (manufacturing) capabilities, our bases in Japan and the United States have manufactured and delivered medical face shields to hospitals, medical institutions and local governments. We are providing as much support as possible to the dedicated healthcare professionals in this difficult situation.

Production of medical face shields

Q Given the impact of COVID-19, what is your perspective on the future business direction?

It is difficult to foresee what the post-COVID-19 world will be like as the situation keeps changing from day to day. Nevertheless, we do not think a drastic change is needed in our policy of promoting growth through two business pillars, namely the Materials Handling Equipment Business and the automobile-related businesses.

We do, however, have to take into account various factors, including the impact on our businesses of the ongoing changes in various needs caused by COVID-19. The following summarizes our planned efforts over the near term.

■ Efforts in Core Businesses

Materials Handling Equipment Business

There has been growing demand for higher logistics efficiencies and lower logistics costs driven by an increase in e-commerce demand and labor shortages. COVID-19 is expected to accelerate the trend. Greater expectations are also placed on automation and autonomous driving technologies for their potential important role in preventing infection. We have already engaged in the development of automation systems for better logistics efficiencies all around the world. In Japan, we have developed an autonomous robot to automatically deliver drugs and various test samples within a university hospital, thus contributing to the reduced workload of healthcare professionals. In Europe, our automated lift trucks have been operating in a food manufacturing plant, both ensuring good hygiene and successfully reducing the work done by human workers under low temperatures. We have also provided an advanced solution combining a logistics system and automated lift trucks to a distribution center of a leading retailer and helped the customer increase its productivity.

Robot transfer system (university hospital)

Automated lift truck
(food manufacturing plant in the Netherlands)

In the materials handling equipment sector, market growth is expected to continue well into the future. At Toyota Industries, this business is regarded as a stock-type business that provides support to customers in various areas, such as after-sales services and sales financing, along with equipment and systems.

We intend to encourage collaboration between the Lift Truck Business, for which we boast the world's top share*, and the Logistics Solutions Business, which we have been strengthening jointly with two subsidiaries, namely Bastian Solutions LLC and Vanderlande Industries Holding B.V., in response to the particularly growing needs in recent years. By doing so, we aim to respond to the changing needs of customers more accurately and achieve sustainable growth.

* Survey by Toyota Industries Corporation

Automobile-Related Businesses

With the idea of social distancing consciously beginning to take root, the value of cars has been reconsidered as a means of mobility that ensures personal space. We will continue to pursue growth in this field by leveraging the strengths of engaging in businesses related to an entire automobile, from vehicle assembly to the manufacture of car air-conditioning compressors, engines and electronics products.

- **Car air-conditioning compressor:** Even though the automobile market may need some time to recover, we will work to increase sales over the medium to long term on the back of an upward trend in automobile sales and an increase in the number of vehicles fitted with an air conditioner. We expect particularly strong growth in demand for electric compressors. We have accordingly developed a large-capacity model used not only for vehicle interior air conditioning but also for cooling batteries and other heat-emitting devices of electrified vehicles.
- **Vehicle:** Toyota Industries manufactures the new RAV4, which was selected as the Car of the Year Japan 2019-2020 and became the first vehicle of Toyota Motor Corporation (TMC) to receive the award in a decade. We also undertook the vehicle's exterior design and upper-body development. Being involved in the production of a globally popular model is a great morale booster for our plant workers. In June 2020, we started manufacturing TMC's new RAV4 plug-in hybrid electric vehicle. The car is selling well, as it offers a long driving range in the battery electric vehicle (BEV) mode and an external

New RAV4 winning the Car of the Year Japan 2019-2020 award

Feeding power at an evacuation shelter
Photo courtesy of Car & Leisure News

power supply function to feed power to home electric appliances during disasters and other occasions. We completed renovations of our vehicle assembly plant two years ago, transforming it into a plant with even greater competitiveness. We will continue to advance our productivity and quality to increase our role within the Toyota Group.

- **Engine:** Diesel engines still have room for growth as an effective means of mobility in inland China, Africa and other emerging countries. We assume a significant role in improving the performance of these engines in environmental and other aspects. Amid the progress of car electrification, hybrid vehicles (HV) still require high-performance engines. We intend to leverage our strengths in this field as well.
- **On-board battery:** With car electrification gaining momentum, we have decided to start the development and production of a new battery. Utilizing our technologies cultivated in the development of batteries for lift trucks, we will develop a high-output, compact, long-life and low-cost battery for adoption in TMC's HVs. This is a fiercely competitive sector on a global scale, but we intend to prevail with our strong product appeal and turn it into a business that underpins the future of Toyota Industries.

Q What about the future direction of management?

To be honest, the profound impact of the COVID-19 pandemic makes it a challenge for me personally, and probably for many business managers as well, to deliver a message this year. The situation keeps changing, and we see different news every day. We thought the infection began to subside at one point but then have to worry about a second wave and the spread of the virus in the Southern Hemisphere. The good news is that the development of vaccines is proceeding and economic activities are resuming; however, the bad news is that there is growing concern about the pandemic becoming prolonged. Many experts are providing various views about the post-COVID-19 world, but the truth is no one knows for sure, or perhaps, it is just meaningless to speculate at this point.

What is important now is to uphold our basic sense of value and calmly and steadily do what we can. As the situation changes, we have to think hard and find our own, right course of action.


Founder Sakichi Toyoda

Toyoda Precepts (corporate creed)

Toyoda Precepts (Corporate Creed)

Carrying out the spirit of founder Sakichi Toyoda,

- Always be faithful to your duties, thereby contributing to the Company and to the overall good.
- Always be studious and creative, striving to stay ahead of the times.
- Always be practical and avoid frivolousness.
- Always strive to build a homelike atmosphere at work that is warm and friendly.
- Always have respect for God, and remember to be grateful at all times.

The Toyoda Precepts (corporate creed), which embrace the spirit of founder Sakichi Toyoda, represent Toyota Industries' basic sense of value. Since our founding, we have always gone back to our philosophy encapsulated in these precepts and endeavored to provide products and services truly needed by customers. I believe our approach aligns with the objective of the United Nations' Sustainable Development Goals (SDGs).

As shown in the "Efforts in Core Businesses" section of this message, our business structure is akin to a conglomerate. Among our diverse businesses, we have explored how we should prioritize them and allocate resources to each in the face of the ongoing pandemic that is having an enormous impact on our society and economy. We have come up with several ideas and options on how to do this. However, it is now too early to decide on which idea or option to implement, and we will need to make flexible responses as we see fit toward the changing situation.

In Conclusion

Japan experienced a series of national crises over a period of about 25 years, including the Spanish flu epidemic in 1918, the Great Kanto Earthquake in 1923 and its defeat in World War II in 1945. The country has risen from the devastating damage of each crisis through the strenuous efforts of the people of that time. The environment we live in now significantly differs from the one in the past, but I think we can learn many lessons from how these people witnessed and recovered from each catastrophe.

Even though there is a common perspective that it will take considerable time for COVID-19 to subside, cooperation is already underway in the healthcare field to develop vaccines and drugs. I believe that promoting such cooperation between countries, regions and businesses will be essential for our recovery in the future.

At Toyota Industries, we intend to overcome the current crisis by sharing best practices and making concerted efforts among our globally operating businesses.

In recent years, we have been witnessing growing uncertainty caused by geopolitical issues, natural disasters, and of course, infectious diseases including COVID-19. Amid this environment, we will continue to pursue sustainable growth by leveraging our technologies, know-how and experience cultivated in our diverse businesses to adapt to a variety of changes and by working even more closely with other companies in the Toyota Group.

We will meet the expectations of our stakeholders through a continuous relationship built from a long-term perspective.

Major Events That Affected Japan

1918 –	Spanish flu epidemic
1923	Great Kanto Earthquake
1930 –	Great Depression
– 1945	World War II

Special Feature 1

Strengths of Our Materials Handling Equipment Business Aiming for Sustainable Growth

Since launching the production of lift trucks in 1956, the Materials Handling Equipment Business has grown into Toyota Industries' mainstay business through increased product appeal, an improved ability to provide excellent services and an enhanced network. In the meantime, the development of the global economy, innovation of information-related technologies and expansion of e-commerce and other new industries have generated new, growing needs in the logistics field. Toyota Industries has responded to such needs and assisted customers in increasing logistics efficiencies by not only offering materials handling equipment as well as logistics systems and equipment but also by focusing on logistics improvements and solutions.

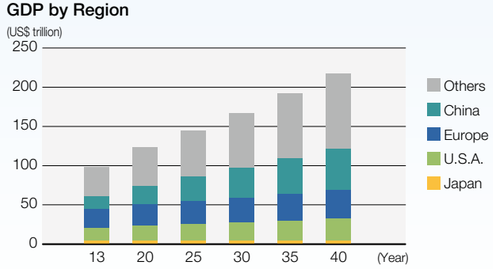
This Special Feature highlights the strengths and initiatives of our Materials Handling Equipment Business that strives to expand business by combining lift trucks and logistics solutions.

Toyota Industries' materials handling equipment as well as logistics systems and equipment support logistics operations of customers worldwide at distribution centers, manufacturing sites, seaports, airports and other locations.

Environment Surrounding Logistics

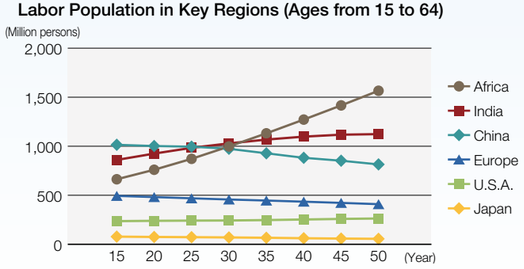
The need for higher logistics efficiencies is growing, driven by an expected increase in logistics volume over the medium to long term on the back of further growth of the global economy, coupled with a rise in labor costs mainly in emerging countries and labor shortages in developed countries. Besides conventional logistics operations using lift trucks, an expansion of e-commerce has increased the need for handling smaller parcels. In this way, customers' logistics-related needs have also become increasingly diversified.

GDP by Region



Source: Produced by Toyota Industries based on the U.S. Energy Information Administration's International Energy Outlook 2017

Labor Population in Key Regions (Ages from 15 to 64)



Source: Produced by Toyota Industries based on the United Nations' World Population Prospects (2017 Revision)

Status of the Materials Handling Equipment Business

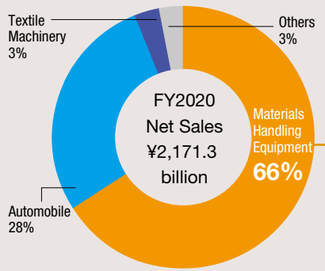
Business Composition

The Materials Handling Equipment Business is Toyota Industries' core business, accounting for 66% of total sales. Lift trucks, our mainstay product, enjoy the world's No. 1 market share*, while our Logistics Solutions Business is one of the largest in the world*. Sales of equipment and those from our stock-type business generating relatively stable revenue, such as after-sales services and sales financing, respectively account for about 40% of total sales in the Materials Handling Equipment Segment. We are working to achieve maximum results by leveraging our business structure we have strengthened to date.

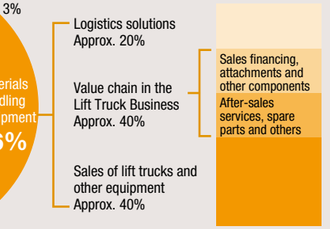
Logistics solutions, on which we have been focusing in recent years to respond to emerging needs, make up a rather small portion of the total sales of the Materials Handling Equipment Business. However, we believe that the business has great growth potential and have been collaborating with two subsidiaries, which we acquired recently, directed toward expansion.

* Survey by Toyota Industries Corporation

Sales Breakdown by Business Segment



Summary of Sales in the Materials Handling Equipment Segment

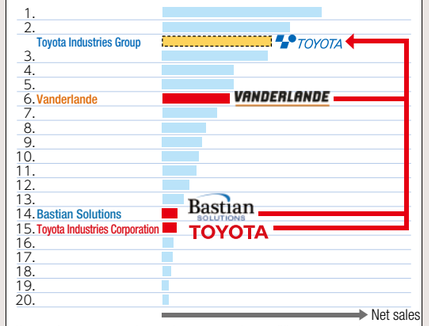


Toyota Industries' Global Lift Truck Market Share (Survey by Toyota Industries Corporation, 2019)

Toyota Industries 19%

World No. 1

Toyota Industries' Position in the Logistics System Supplier Industry



Source: Produced by Toyota Industries based on the Top 20 Worldwide Materials Handling System Suppliers in 2020 by *Modern Materials Handling* magazine

Initiatives for Future Growth

Innovation spurred by CASE (connected, autonomous, shared and electric) technologies in the automobile industry is also advancing in the materials handling equipment industry. Based on our broad product lineup and accumulated know-how in logistics improvement, we are strengthening our initiatives in this area for further growth.

Connected: Systems that offer advanced operational management by connecting lift trucks and other equipment to the Internet and collecting relevant data have become popular mainly among large-order customers. In addition to increasing the efficiency of logistics operations, these systems visualize and analyze such variables as the operational status and battery consumption of each lift truck and help improve safety and save energy.

Autonomous: Lift trucks are used for logistics operations mostly in plants and warehouses. Because they operate in such limited locations, work standardization and automation are easier compared to automobiles. We added automated guided forklifts (AGF) to our lineup in the 1980s and have been accelerating the development of products that leverage our automation technology in response to the growing need for higher logistics efficiencies.

Solution: At Toyota Industries, "S" is defined as "solution," through which we seek to solve logistics issues and make proposals for increasing efficiencies. In this endeavor, we go a step beyond straightforward automation. We have been strengthening initiatives on a global basis to provide logistics solutions that are suited to the type and scale of customers' businesses, accurately capture their individual needs and that are packaged as optimally designed systems.

Electric: The introduction of electric lift trucks has started early on in the materials handling equipment industry as customers in certain sectors are required to satisfy zero emissions and other clean performance standards. Currently, more than 60% of lift trucks sold in the world market are electric. At Toyota Industries, the ratio is more than 70%. We respond to customers' diverse needs by developing and increasing the lineup of products, including models equipped with lithium-ion batteries and fuel cell lift trucks.

Among our CASE initiatives, the following pages provide example initiatives in the "S" (solution) and "A" (autonomous) fields, which have been drawing increasing attention from customers.

Operational management system

Fuel cell lift truck

Example 1 Initiatives in the Logistics Solutions Field

With the acquisition of Bastian Solutions LLC and Vanderlande Industries Holding B.V. in 2017, we set up a structure to offer an even broader range of logistics solutions to more customers. The three companies, including Toyota Industries, have been working together and successfully created new business opportunities.

Collaboration of Bastian and Vanderlande in the Development of Image Recognition Technology

At warehouses and distribution centers, order picking to pick up ordered items from stock storage is one of the most important operations and reducing pick-up errors is essential in increasing productivity. Many processes at logistics sites have already been automated and contributing to higher productivity. However, automation of the order picking process has not proceeded, as picking up correct items of varying forms and materials poses a technical challenge.

Bastian and Vanderlande, which each develops automated picking systems independently, have formed a joint team to accelerate the development of advanced technologies that satisfy market demand. Instant recognition of the location and shape of an item and its stored position is crucial in ensuring the correct picking up of items whatever their shapes are and however they are stored. As such, automation of the process requires advanced image recognition technology. The joint team is mainly engaging in the development of this technology and aiming for early commercialization by increasing accuracy through feasibility tests using order picking robots of each company.

We will continue to deepen the collaboration between the two companies and develop technologies and systems that will contribute to greater logistics efficiency.

Example of image recognition

Working Together in Japan for a Global Delivery Service Operator through the Collaboration of Vanderlande and Toyota Material Handling Japan

One of the important customers of Vanderlande is the world's largest-class operator engaging in international delivery services. Up to the present, Vanderlande has built systems for the operator's distribution centers in many countries, but lacking a base in Japan, had not been able to support them in this regard. On the other hand, Toyota Material Handling Japan, which is responsible for Toyota Industries' Lift Truck and Logistics Solutions Businesses, has been developing and selling materials handling systems and equipment in Japan, but in some cases could not fully satisfy customer needs, including the above-mentioned operator, due to its limited system and equipment lineup.

Meanwhile, Toyota Industries has appealed the strengths of the entire Group encompassing Bastian and Vanderlande to a broad audience through trade shows and other opportunities. At the same time, we have concentrated on the establishment of a structure to sell and provide support services for a wide range of Vanderlande's equipment and systems in Japan.

These efforts have enabled us to offer the full spectrum of logistics systems in Japan, including those of Vanderlande, and we received an order from the said operator for the first time for a project for a distribution center in the country.


Vanderlande's CROSSBELT SORTER

Web
Link to sorter details.

In the Logistics Solutions Business, Group companies complement each other in terms of geographical coverage and the size and business category of target customers through increased collaboration within the Group, and we can now offer solutions that combine the "hardware" and "software" of each company. Collaboration with the Lift Truck Business has increased opportunities to offer an even broader set of logistics solutions to customers using our lift trucks. Based on our comprehensive strengths, we seek to accurately respond to our customers and further realize business expansion.

Example 2 Initiatives Related to Automation

Since starting the production of lift trucks in 1956, our efforts have been geared toward logistics automation in the future. We started producing magnetic-type automatic guided vehicles (AGVs) and AGFs in the 1980s and have since been working to increase the lineup in this area. Toyota Industries' AGVs accurately capture the varying needs of each logistics site, such as carrying industrial products in plants or warehouses, conveying baggage at airports and transporting large containers at seaports, thereby contributing to customers' improved logistics efficiencies.

Going ahead, we will further bolster the development of AGVs and AGFs while leveraging our image recognition and other cutting-edge technologies and promoting collaboration with external organizations.

Taking on a Challenge of Automating Outdoor Operations

Capitalizing on our technology and know-how for autonomous driving obtained through the development of AGVs and AGFs for indoor use, we have been developing technology for automated operations outdoors, for which needs are growing.

We have conducted outdoor feasibility tests of our AGFs at several locations, including a facility shipping agricultural products. Outdoor automated operations pose a far greater challenge than indoor operations because of uneven surfaces and irregular cargo locations. We have also carried out two autonomous driving tests of our towing tractors, which transport baggage and other items at airports, under different conditions. Our focus is to promote the development of systems that can ensure safe and smooth automated operations and cargo transportation at a place crowded with various types of vehicles.

In the future, we will repeatedly conduct feasibility tests on automated operations of lift trucks and various materials handling equipment for swiftly achieving their practical use.


AGF feasibility test

Evolution of AGVs

Utilizing AGVs for which we have been engaging in the development for many years, we are making efforts in achieving a more advanced level of logistics automation. With distribution centers becoming increasingly larger, one challenge is to reduce the workload of operators carrying items during a process that involves picking up ordered items from storage shelves. In response, we have utilized our experience in AGV development to create an autonomous logistics robot that tracks the picking operator at a certain distance and can be summoned or directed to a specified location at the beginning or end of work. We are accelerating our development efforts for its commercialization based on the results of feasibility tests undertaken at logistics sites of our customers.

Among our products for use in airports, for which we expect growth in the number of users over the medium term, we have been focusing on the commercialization of autonomous AGVs. An autonomous baggage handling system developed by Vanderlande, in particular, has already gone into full-scale operation in Rotterdam The Hague Airport. The system can flexibly accommodate layout changes on the operating route and system expansions. Efforts are also underway to integrate AGVs manufactured at one of our lift truck production bases in Europe into the system. We are stepping up efforts to increase its use mainly at hub airports around the world as an epoch-making system that replaces conventional conveyors.


Autonomous logistics robot


Autonomous baggage handling system used in airports

Web
Link to system details.

Message from the Director

Logistics needs have become increasingly diversified and have continued to change. Leveraging our experience and know-how accumulated while working with customers worldwide, we seek to develop products and services that go a step ahead of the times and offer optimum solutions to individual customers. Fueled by an accelerated expansion of the e-commerce market as a result of the spread of COVID-19 and other factors, needs in the logistics solutions field are on the rise, which in turn is expected to advance the mechanization and automation of logistics operations. As a response to the changing environment, we are working to expand business by further strengthening the collaboration of Bastian, Vanderlande and Toyota Industries, each of which possesses different strengths. We aim to become the world's leading logistics solutions provider to help customers resolve their logistics-related issues by harnessing our strengths in engaging in the two businesses of lift trucks, for which we enjoy the world's top market share, and logistics solutions, for which significant growth is expected in the future.


Yojiro Mizuno
Director and
Senior Executive Officer

Special Feature 2

Leveraging the Strengths of Diverse Businesses to Adapt to Changes and Seek Sustainable Growth

Changes in customer needs and advances in technology have been proceeding at an increasing pace. There has also been lingering uncertainty about political and economic prospects. Amid this environment, Toyota Industries believes that engaging in multiple businesses with different strengths, as opposed to focusing solely on a specific business, will allow us to adapt to changes and achieve sustainable growth through complementary collaboration among these businesses.

This Special Feature presents some of our initiatives to promote sustainable growth by leveraging the strengths of our diverse businesses.

History of Business Expansion to Date

After conducting a great deal of research, founder Sakichi Toyoda invented the Type G automatic loom with an aspiration to “contribute to society through *monozukuri* (manufacturing).” Toyota Industries, founded to manufacture and sell the loom, had concentrated on expanding this original business but started seeking business diversification during the recession in the early 1950s.

At that time, the growing automobile industry in Japan was generating new needs. To capture these needs, we first branched out into the engine and vehicle assembly businesses by utilizing foundry and other technologies accumulated in the textile machinery field. Then we started developing and manufacturing car air-conditioning compressors. As labor shortages prompted a rise in the need for streamlining cargo handling, we directed our attention to lift trucks that have a number of components similar to automobiles such as an engine and launched development in this field. Moreover, capitalizing on our technology and know-how accumulated in the development and in-house production of electronic components for lift trucks, we entered the electronics business, offering electronics products also for automobiles.

In this way, we have constantly taken on the challenge of creating new value based on our own strengths and achieved continued growth, always upholding the philosophy of “contributing to society” since our founding.

Efforts to Deepen Collaboration among Businesses to Generate Ideas

Previously, business divisions of Toyota Industries had made development efforts individually, and in some cases, had not been able to fully leverage the necessary technical information or know-how and knowledge accumulated in other divisions. In recent years, the R&D Headquarters, an organization responsible for promoting research and development, has been assuming the role of ensuring horizontal alignment and promoting collaboration among the business divisions.

As these business divisions face similar technical issues and possess many common elemental technologies, we have been devising effective ways to generate synergies among them by collecting, disseminating and sharing information and providing opportunities for technical exchange.

We believe that these day-to-day efforts have helped us upgrade and increase the efficiency of our development activities.

For information gathering, we provide various forms of support. Examples include issuing *Toyota Industries Technical Review*, a magazine on technical information related to product development and *monozukuri*; disseminating information on changes in the R&D environment, including economic conditions in each country and the trends in the materials handling equipment and automobile industries; and presenting examples of companies having technological excellence. As opportunities for technical exchange, we hold Company-wide technology exhibitions of products and production engineering examples of each business division and meetings of the Council of Heads of Engineering Departments as a place for heads of the engineering departments of each business division to exchange information. Through these opportunities, we back up efforts to share and utilize technologies within Toyota Industries.

Company-wide technology exhibition (December 2019)

Toyota Industries Technical Review

Web
Link to *Technical Review* (in Japanese).

Example Outcome of Interdivisional Collaboration

1 Development of Hydrogen Circulation Pump and Inverter for Fuel Cell Vehicles — Compressor, Electronics

Kazuho Sato

Project leader
FC Project
Compressor Division
(As of March 31, 2020)

Background of Development

Toyota Industries’ hydrogen circulation pump and control inverter are fitted in a fuel cell vehicle (FCV) of Toyota Motor Corporation (TMC), which only emits water when driven and greatly contributes to a reduction of CO_2 emissions. As an FCV runs on electricity generated through a chemical reaction of hydrogen and oxygen, it significantly differs in structure from an internal-combustion vehicle. With a pool of compression technology accumulated in the Car Air-Conditioning Compressor Business and motor, inverter and other elemental technologies, however, we had faith in our ability to create a hydrogen circulation pump and inverter, two of the key components of an FCV critical to its driving performance. Applying these technologies, we launched development of the two components and succeeded in mass production.

Utilization of Existing Technologies

Hydrogen circulation pump

Developed by the Compressor Division

Efficiently circulates unreacted hydrogen and water generated in the electricity generation process.

Successfully developed a new, low-cost hydrogen circulation pump that is highly efficient, more compact and lighter weight by applying compression, motor and production engineering technologies accumulated in the car air-conditioning compressor field.

Inverter

Developed by the Electronics Division

Performs drive control of the pump with a minimum amount of electricity.

Developed a highly efficient inverter for a hydrogen circulation pump at a low cost by applying inverter engineering technologies accumulated in the electric car air-conditioning compressor field.

Control software

Developed by the Compressor Division

Quickly developed a high-quality control software program by applying software programs for electric car air-conditioning compressors.

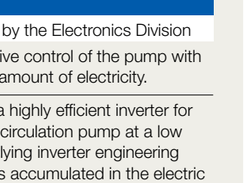
Completing a Hydrogen Circulation Pump by Overcoming Major Development-Related Challenges through Close Interdivisional Collaboration

We received various requests from TMC as it underwent the process of trial and error for the development of an FCV. One of them, in particular, related to the need to ensure smooth start-up and operation of the vehicle in sub-zero temperatures. In response, the circulation pump and inverter development teams worked together and improved the pump's startability and controllability. They also had repeated discussions from various perspectives for the alignment of work on the activation of an inverter at high temperatures.

The previous collaboration between the Compressor Division and Electronics Division in developing an electric compressor enabled us to quickly overcome the challenges in the new field. These divisions smoothly forged ahead with the development of respective products while mutually taking into account the impact of their own product on the other's product. This led to development activities that focus on overall optimization, transcending individual products. Other benefits included less time spent on discussion with the customer and increased efficiency in project flow.

We successfully developed products that generate new added value by bringing together and harmonizing elemental technologies cultivated in each business division.

Toward car electrification, the development of diverse products will become increasingly important in the future. We intend to leverage our advanced collaborative structure to provide new products through swift development efforts at a high level.



Example Outcome of Interdivisional Collaboration

2 Development of a Diesel Hybrid System for Construction Machinery

Materials Handling Equipment | R&D Headquarters | Engine | Electronics

Kenichi Katae

General Manager
Engineering Dept. No. 2
R&D Headquarters
(As of March 31, 2020)

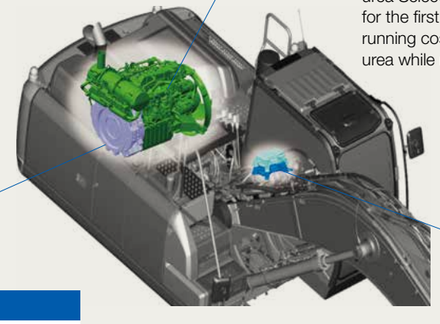
Background of Development

Since going into effect in 1991, the exhaust gas regulations for construction machinery have become progressively more stringent, and energy-saving needs have been also growing considerably. Against this backdrop, a leading construction machinery manufacturer has been promoting the development of environment-friendly hybrid excavators. We became the manufacturer's first choice as its partner because we had already had experience in developing hybrid systems, with Toyota Material Handling Japan initiating sales of a hybrid lift truck in 2010. The idea was to apply technologies we have cultivated in the electric lift truck field and in the Electronics Business to a hybrid system for construction machinery. Multiple business divisions of Toyota Industries accordingly started collaborating and developing key components, including an engine and a motor.

Fruits of Collaborative Development

Diesel hybrid system for construction machinery

Offers a 40% better fuel efficiency while maintaining high power performance.



Diesel engine Developed by the Engine Division

Satisfied exhaust gas regulations without using a urea Selective Catalytic Reduction (SCR)*1 system for the first time in the world*2 and achieved lower running costs by eliminating the need for refilling urea while maintaining durability.

Equipped in the ZH200-6 hybrid excavator of Hitachi Construction Machinery Co., Ltd.

Motor

Developed by the Engineering Dept. No. 2, R&D Headquarters

Offers high output and high efficiencies through an engine with a built-in motor, which can be fitted into the conventional engine space.

PCU (controlling motor's rotational speed)

Developed by the Electronics Division

Is based on a compact and highly efficient PCU for hybrid vehicles and offers improved cooling performance and vibration resistance matched to construction machinery.

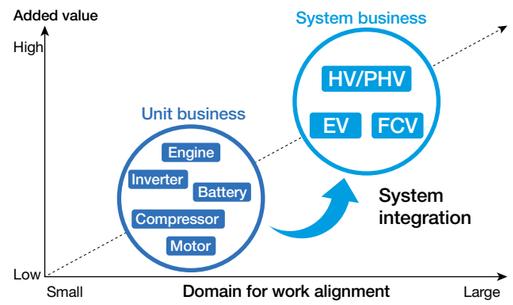
*1: Means to convert NOx
*2: Survey by Toyota Industries Corporation

Realizing a Hybrid System for Construction Machinery by Integrating Highly Functional Components

The most crucial challenge was how to realize an optimum system for construction machinery used in a considerably harsher environment than automobiles. To overcome this challenge, the Engineering Department No. 2 of the R&D Headquarters conceived the optimum design of the overall system, and each business division embarked on the development of an optimum component using the design as a starting point.

Specifically, we had to install components of the hybrid system, including an engine, motor and power control unit (PCU), into the conventional engine space. To accommodate more components, we needed to reduce the overall size, and at the same time, had to ensure the level of performance required for construction machinery. Taking on a challenge we had never faced before, the relevant business divisions joined forces and used their ingenuity to find a solution, which led to quickly developing a high-quality system.

Furthermore, we believe that already having a lift truck as a finished product in our lineup enabled us to take a holistic view in developing a hybrid system for construction machinery that is mechanistically similar to lift trucks. The result was a system that has realized a 40% higher fuel efficiency than conventional internal-combustion excavators, while maintaining the equivalent level of power performance.



HV/PHV: Motor, inverter, battery and engine
EV : Motor, inverter and battery
FCV : Motor, inverter, battery, oxygen-supplying air compressor and hydrogen circulation pump

Toyota Industries has a number of core technologies required in electrified products, such as hybrid vehicles (HV), plug-in hybrid vehicles (PHV), electric vehicles (EV) and FCVs, which are expected to become more diversified in the future. Going ahead, we intend to respond to electrification both in the materials handling equipment and automobile fields and swiftly deliver the required products to the world by combining components from these two fields and offering them as an integrated system.

Business Activities

Materials Handling Equipment — P26–30 | Automobile (Vehicle / Engine / Car Air-Conditioning Compressor / Car Electronics) — P31–36 | Textile Machinery — P37

Materials Handling Equipment

As a market leader with an extensive knowledge of global logistics needs, Toyota Industries provides a range of materials handling equipment, mainly lift trucks, and logistics solutions to customers.

Web
Link to product details.

Medium-Term Direction of Business

We will work to develop and propose new products and services incorporating cutting-edge technologies through the proactive use of open innovation and co-creation with customers.

Our goal is to become the logistics solutions partner of the first choice for customers by meeting their wide-ranging needs and helping them increase their logistics efficiencies based on the Toyota Industries Group's comprehensive strengths covering both the lift trucks and logistics solutions fields.

Business Characteristics

Strengths

- An extensive logistics-related product lineup both in the fields of materials handling equipment (internal-combustion lift trucks, electric lift trucks, fuel cell (FC) lift trucks, etc.) and materials handling systems (automated storage and retrieval systems, automatic guided vehicle (AGV) systems, automated lift trucks, etc.)
- High technological capabilities, including those linked to environmental and safety performance
- Production know-how that ensures high levels of quality and production efficiency
- Global, well-developed production, sales and service networks
- An extensive value chain encompassing in-house development and production of engines, motors and other key components; total after-sales services including maintenance and inspections as well as operational management; and sales financing operations offering more options in sales
- No. 1*1 in lift truck unit sales in the world
- A wealth of experience and know-how as well as a global network in the Logistics Solutions Business
- Software development capability to create such systems as a warehouse management system

*1: Survey by Toyota Industries Corporation

Opportunities

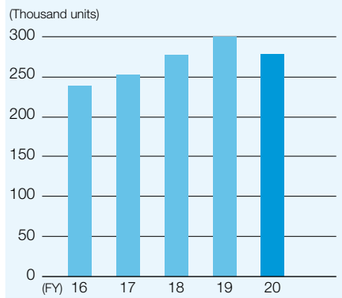
- An expansion of global logistics volume in line with an increase in the world population and economic growth
- Growing need for products with high energy savings and low environmental impact following enforcement of more stringent environmental regulations around the world
- Growing need for electric lift trucks driven by a rise in eco-consciousness
- Rising need for higher logistics efficiencies prompted mainly by a growth in e-commerce transactions as well as soaring labor costs and labor shortages

Risks

- Restrained capital investment due mainly to a slowing economy and disasters
- Weaker sales due to intensifying competition
- Change in business environment triggered by an expanding market of low- to mid-priced lift trucks
- Suspension of production caused by supply chain disruptions

	FY2019	FY2020
Net Sales	¥1,466.6 billion	¥1,436.3 billion
Operating Profit	¥114.6 billion	¥102.2 billion

Materials Handling Equipment Sales



Business Overview in Fiscal 2020

In the Materials Handling Equipment Business, the lift truck market in 2019 turned downward except for China, where sales continued to increase. Amid this operating climate, Toyota Industries engaged in sales and after-sales service activities matched to respective markets. However, unit sales of lift trucks for fiscal 2020 were down 22,000 units, or 7%, to a total of 278,000 units from the previous fiscal year. As the need for higher logistics efficiencies is getting increasingly stronger, underpinned by an expansion of the e-commerce market, Toyota Industries made efforts for further business reinforcement through collaboration with logistics solutions subsidiaries in the United States and Europe. Net sales in fiscal 2020 declined by ¥30.3 billion, or 2% year on year, to ¥1,436.3 billion.

Business Structure

Toyota Industries' Materials Handling Equipment Business is operated under a two-organization structure: Toyota Material Handling Group (TMHG) responsible for the Lift Truck Business and Toyota Advanced Logistics Group (TALG) engaging in the Logistics Solutions Business. TMHG and TALG collaborate with each other to achieve overall growth of the Materials Handling Equipment Business while reinforcing individual businesses.

Toyota Material Handling Group (TMHG)

Toyota Industries assists customers worldwide in attaining greater logistics efficiencies as a market leader in the materials handling equipment and logistics fields by delivering logistics solutions optimally tailored to their specific and ever-changing needs.

Under the TMHG management structure, we engage in the Lift Truck Business under the TOYOTA, BT, RAYMOND, CESAB and Taillift brands. Mutually utilizing the development and sales strengths of each brand, TMHG is promoting business on a global scale.

We basically carry out product development in three regions, namely Japan, North America and Europe. Based on this structure, we develop and manufacture products in each region, which are matched to the specific local needs and characteristics, and ensure quick product delivery to customers. At the same time, we seek greater product appeal by conducting in-house development and production of key components of lift trucks, including engines and motors. In response to the enforcement of stricter environmental regulations and growing eco-consciousness worldwide, we are improving the energy-saving performance and enhancing our electric lift truck lineup. We are also promoting development of autonomous driving technology as a response to growing needs for greater logistics efficiencies mainly driven by labor shortages.

In addition to supplying high-quality products, we have established a structure to support customers throughout our entire value chain that encompasses from providing after-sales services through our extensive networks to offering sales financing operations. We contribute to greater logistics efficiencies based on our comprehensive strengths in satisfying varying needs of customers worldwide. On the sales front, we are offering products and logistics improvement solutions optimally matched to individual customers' logistics sites. Simultaneously, we are seeking to obtain large orders by responding to demands of customers who conduct business globally. In terms of services, we assign experienced and knowledgeable personnel and utilize leading-edge information technology (IT) to provide finely tailored services to customers. Our service personnel visit customers on a periodic basis and provide maintenance services to prevent troubles from occurring. When a problem does occur, they swiftly make a visit to the customer and promptly take appropriate action. We are also strengthening our internal sales financing operations mainly in Europe, the United States and other developed countries in order to respond to customers' diverse needs in the area of equipment sales. Additionally, TMHG is collaborating with TALG to create synergies between the lift trucks and logistics solutions fields in development and other domains.

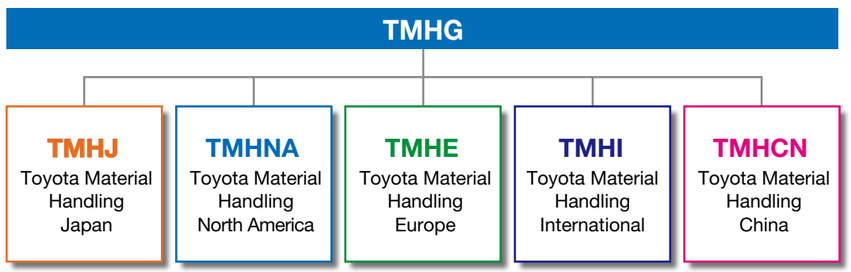
Toyota Advanced Logistics Group (TALG)

Following an expansion of the e-commerce market, providing solutions to diverse and complex logistics issues for distribution centers has become a pressing task, and needs for logistics solutions have been growing globally.

Amid this environment, we go a step beyond just providing a broad range of materials handling equipment and associated software programs and are reinforcing our Logistics Solutions Business to more meticulously satisfy each customer's varying needs by leveraging our logistics improvement know-how accumulated to date.

Under the TALG management structure, the Logistics System Engineering Department of Toyota Material Handling Japan, which mainly engaged in business in Japan, and two companies that joined the Toyota Industries Group in 2017, namely U.S.-based Bastian Solutions LLC and Netherlands-based Vanderlande Industries Holding B.V., are collaborating with each other in development, sales and other activities to expand business while leveraging their individual strengths.

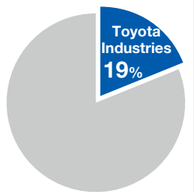
Toyota Material Handling Group



The Toyota Material Handling Group possesses several brands such as TOYOTA, BT and RAYMOND and engages in business by dividing the world into five areas: TMHJ (Japan), TMHNA (North America), TMHE (Europe), TMHI (Asia, Australia, etc.) and TMHCN (China).

Toyota Industries' Global Lift Truck Market Share

(Survey by Toyota Industries Corporation, 2019)



World No.1

■ Toyota Advanced Logistics Group

*2: Toyota Advanced Logistics North America (Holding Company of Bastian)

Under TALG, the Logistics System Engineering Department of Toyota Material Handling Japan, Bastian and Vanderlande work together to promote the Logistics Solutions Business on a global scale while leveraging their individual strengths.

Business Activities in Fiscal 2020

Despite continued growth in China, the world's lift truck market in 2019 turned downward with weaker sales in Japan, North America, Europe and emerging countries. Amid this environment, we worked to enhance the product appeal of our mainstay lift trucks and expand sales. We also strove to offer reliable after-sales services, enhance responsiveness to large-order customers and provide solutions to achieve greater logistics efficiencies through the introduction of distribution systems.

To meet the diverse needs of customers in the field of lift trucks, we made efforts to increase our product lineup in each region and promoted the development of autonomous driving technology internally and with external organizations. We also worked to reinforce our IT-based services in order to ensure a more accurate response to individual customers.

In the logistics solutions field, we have been accelerating coordinated activities as TALG to mutually supply equipment and systems while encouraging each company to leverage its strengths to bolster business.

Meanwhile, Aichi Corporation, which possesses the top brand*3 in the field of aerial work platforms in Japan, enjoyed a growth in demand up until the first half of fiscal 2020, driven by enforcement of strict emissions standards. However, demand declined on the rebound in the second half. Sales were also affected by Typhoon Hagibis that made a landfall in Japan in 2019 and decreased in all industries except for the leasing industry. As a result, Aichi's overall sales were down from the previous fiscal year.

Aichi Corporation's aerial work platform

*3: Survey by Aichi Corporation

Activities of TMHG

Japanese Market

The business environment in Japan became difficult as the lift truck market slowed down slightly in 2019. It was further compounded as the production of lift trucks at a Toyota Industries plant was suspended due to a disruption of parts supply following Typhoon Hagibis. Unit sales of Toyota Industries' lift trucks consequently declined by 6% year on year to 45,000 units in fiscal 2020, but still maintained the top position*4 in calendar 2019 for the 54th consecutive year.

In recent years, customer needs have become increasingly diversified in line with changes in the business environment, including an expansion of the e-commerce market, labor shortages and growing safety and environmental consciousness among companies. As the leading manufacturer of materials handling equipment, Toyota Industries has been proactively promoting the release of new products that lead to resolving issues facing customers.

For example, we released an FC lift truck for the first time in Japan*5 in 2016. This 2.5-ton model has been highly acclaimed by customers not only for its excellent environmental performance of not emitting CO_2, NOx and other gases while in operation but also for its great convenience of completing hydrogen charging in about three minutes. More recently, we added a 1.8-ton type as growing environmental consciousness pushed up needs for smaller models. As part of efforts to enhance the lineup of FC models, we have also conducted a feasibility test of an FC towing tractor.

1.8-ton FC lift truck

Needs are also growing for the automation of materials handling equipment to reduce logistics work and improve efficiencies. In response, we have carried out autonomous driving tests of our towing tractors jointly with All Nippon Airways Co., Ltd. within restricted areas at Kyushu-Saga International Airport and Chubu Centrair International Airport. We have also joined the Consortium for Open-Field Agricultural Robotics*6 engaging in research and development for labor saving in the agricultural field. Our part in the project is to develop a lift truck that autonomously loads cargoes onto a truck.

In February 2020, we participated in Logis-Tech Tokyo – INNOVATION EXPO – under the concept of "Exact Solutions to Your Logistics." We ran the largest booth among the participating companies and showcased to some 22,000 visitors our latest logistics solutions, including the Key Cart automatic guided vehicle (AGV) based on simultaneous localization and mapping (SLAM) technology and the AiR-T autonomous intelligent mobile robot.

Toyota Industries' booth at Logis-Tech Tokyo

*4: Survey by Toyota Industries Corporation based on data published by Japan Industrial Vehicles Association
*5: Survey by Toyota Industries Corporation
*6: Consortium engaging in a research and development project, selected as an Innovative Technology Development and Immediate Deployment Project (in the category of Future Agriculture Creation Projects Using Artificial Intelligence) of the National Agriculture and Food Research Organization's Bio-oriented Technology Research Advancement Institution

North American Market

With a year-on-year decline in the North American lift truck market in 2019, Toyota Industries posted unit sales in fiscal 2020 of 92,000 units, down 7% from the previous year, but still remained the market share leader*7 in 2019. Meanwhile, parts sales and orders for after-sales services remained strong.

Amid this environment, Toyota Industries is proactively pushing ahead with product lineup and functional enhancements both under the TOYOTA and RAYMOND brands.

Toyota enhanced its electric product offering not only with the release of a 1-ton electric lift truck that has been developed by a subsidiary in North America based on local customer needs but also with the addition of a number of new options to its electric pallet trucks. The focus was also on battery solutions that present optimum ways of charging and handling batteries. Toyota's efforts for improving the competitiveness of its dealers include operating an after-sales service evaluation and certification system and promoting a program to build a leaner and more efficient business structure in a systematic manner. Some Toyota dealers have also captured a new business opportunity by starting to use this program to solve customers' problems.

1-ton electric lift truck

Raymond further augmented the functionality of its iWAREHOUSE fleet management system. It has evolved into a platform to centrally manage various functions associated with warehouse equipment, from the existing roles to certify operators, detect collisions and analyze the operational status of lift trucks to additional features to manage personnel and provide virtual reality (VR) operation training. Raymond developed a new system to remotely support operators' order picking work and has been leveraging cutting-edge technologies to assist customers in increasing their logistics efficiencies.

iWAREHOUSE

Additionally, Toyota and Raymond are selling parts and entry-level models and providing safety operations e-learning materials through e-commerce sites to provide greater convenience to customers and expand business opportunities. Toyota and Raymond are also accelerating technology development for next-generation materials handling equipment by working closely together with two universities.

Toyota Industries will continue to promote product development, sales and after-sales service activities by leveraging the strengths of the two brands. In addition, through closer collaboration with the Logistics Solutions Business we will accurately respond to the needs for greater logistics efficiencies, including those for automation.

*7: Survey by Crist Information & Research, LLC, 2019

European Market

Although the European lift truck market in 2019 was down from the previous fiscal year, Toyota Industries posted unit sales of 93,000 units in fiscal 2020 on par with fiscal 2019. In addition to new lift truck sales, orders for after-sales services and sales of parts remained strong.

In Europe, needs for connected and automated lift trucks are growing. Toyota Industries offers I_Site, a fleet management system that enables customers themselves to collect and analyze operational and other information of their lift trucks connected to a network. More than 12,000 lift trucks are now using I_Site. We are also fostering partnerships with outside companies to reinforce our development capabilities in the fields of automation and other advanced technologies. As part of this effort, Toyota Material Handling Europe (TMHE), our European headquarters for materials handling equipment, hosted the Logiconomi Forum, inviting leading companies in various industries to give lectures and exchange views.

Logiconomi Forum

As for electrification, TMHE released a new electric pallet truck with an entirely optimized structure. The adoption of lithium-ion batteries has made the resulting truck considerably smaller, lighter, more energy-efficient and easier to operate. The truck received the iF Design Award 2020 for these excellent features. TMHE also rolled out new internal-combustion counterbalanced lift trucks surpassing the latest EU Stage V regulations. These trucks are equipped with internally produced engines, which offer high efficiency, reliability and maintainability.

New electric pallet truck

We will continue to upgrade the environmental performance and other functions of our products and help customers improve their logistics efficiencies by focusing on automation that leverages the latest technologies.

ALOMA*8 and Chinese Markets

Toyota Industries covers the ALOMA markets of some 60 countries in Asia, Latin America, Oceania, the Middle East and Africa as well as the Chinese market. We are serving these markets with a lineup consisting of TOYOTA, BT, RAYMOND and Tailift brands.

In 2019, the ALOMA market declined from the previous fiscal year while the Chinese market continued to expand. Amid such conditions, Toyota Industries worked to enhance its product lineup, reinforce sales and after-sales service activities and promote logistics improvement solutions. In spite of these efforts, unit sales were down 18% from the previous fiscal year to 48,000 units in fiscal 2020.

To date, Toyota Industries has launched sales activities with a focus on logistics improvement solutions in 14 countries. We are strengthening our relationships of trust with customers by offering solutions to reduce logistics

costs and improve safety at their logistics sites. Our dealers are also promoting improvements at their own facilities to bolster their abilities to make improvement proposals to customers. We will promote these and other efforts as customers' total logistics solutions partner.

In the field of after-sales services, we are proceeding with the introduction of the Global Mobile Service Solution (GMSS) that leverages Internet of Things (IoT) technology. GMSS centrally manages information on lift trucks owned by customers and the history of repairs conducted by dealers in each country by using cloud services. Through this system, we will reinforce our capability to provide better after-sales services. We are also utilizing telematics to collect operational information of lift trucks. The aim is to minimize downtime by analyzing this information to foresee and prevent equipment failures. Additionally, we established T-CORE, a new system to share customer information, lift truck specifications and production data with our dealers by using cloud services. Dealers in each country will use this system when placing orders to Toyota Industries. Going ahead, we will share with our local dealers information of our lift trucks throughout their lifecycle by linking GMSS, telematics and T-CORE, thereby establishing a system to ensure a quick response to customers.


GMSS mobile service system

As the leading manufacturer of materials handling equipment, Toyota Industries will offer comprehensive logistics solutions and satisfy the diverse logistics needs of customers.

*8: ALOMA is a Toyota Industries term for Asia, Latin America, Oceania, Middle East and Africa.

Activities of TALG

Logistics System Engineering Department of Toyota Material Handling Japan

In Japan, the installation of logistics systems that bring about labor and work savings in distribution centers has been proceeding rapidly in line with the exacerbating issue of labor shortages. Toyota Industries is enhancing its product offering throughout the entire logistics operations by introducing systems and equipment of Bastian and Vanderlande into Japan.

Bastian's ULTRA automatic truck loading and unloading robot has started operating at a customer's logistics site and has already contributed to improved work efficiency. We also accept orders for Vanderlande's high-speed CROSSBELT SORTER and engage in sales negotiations for the company's ADAPTO, a high-speed storage and retrieval system. With Toyota Industries supporting the introduction of the two companies' products into Japan, we are making a more meticulous response to the needs of customers in the country. (See Special Feature 1 on pages 18–21 for details of collaboration among the three companies.)


ULTRA

Bastian

On the back of strong needs for logistics automation not only in the e-commerce sector but also in the manufacturing and retail sectors in North America, Bastian has been receiving orders from customers in a broad range of business categories and expanding sales.

Based on a wealth of know-how accumulated in small- to medium-scale projects, Bastian has increased its capabilities for large system development and integration, thereby successfully receiving an order for the largest project in its history in 2019. Working together with TMHJ, Bastian has rolled out ULTRA, an automated system leveraging its strengths in developing cutting-edge technologies, in the Japanese market.

In North America, Bastian has been accelerating its offering of logistics solutions to lift truck users by reinforcing collaboration with dealers of the TOYOTA and RAYMOND brands.

Vanderlande

In Europe and the United States, an expansion of the e-commerce market and labor shortages have caused a sharp increase in needs for automated systems. Under such conditions, Vanderlande steadily increased orders from and sales to warehouse logistics and parcel/postal services, obtaining orders related to the establishment of new distribution centers as well as long-term servicing contracts from leading global operators of e-commerce, retail and delivery services. In the warehouse logistics business, in particular, Vanderlande has been reinforcing system development targeting industry's top companies and focused business categories according to its basic business strategy. Recently, orders have been growing from the apparel industry for solutions leveraging its pocket sorter to pick and sort goods into hanging pockets.


Pocket sorter

In the airport business, Vanderlande obtained orders for systems for new terminals from existing airport customers as well as long-term servicing contracts based on its long-standing relationships of trust. The company is working to further augment such relationships.

Vanderlande is also promoting collaboration within the Toyota Industries Group, working together with the Logistics System Engineering Department of TMHJ and Bastian to introduce its systems into the markets in Japan and North America, respectively.

Automobile

In the fields ranging from vehicle to engines, car air-conditioning compressors and car electronics, Toyota Industries continues to meet the expectations and trust of its customers.

Web
Link to product details.

Strengths

- An agile structure to undertake all aspects from planning and development to production within a plant (Vehicle)
- Highest-level production efficiency and quality among all Toyota-affiliated automobile body manufacturers (Vehicle)
- Know-how on the development and production of diesel engines and turbochargers (Engine)
- Highly efficient production of high-quality gasoline engines, including those for use in hybrid vehicles (HV) (Engine)
- Ability to develop excellent products with greater fuel efficiency, quieter operation, compactness, light weight and ease to mount on vehicles (Car air-conditioning compressor)
- Global top-share*1 products for use in a full range of vehicles, from internal-combustion vehicles to HVs, plug-in hybrid vehicles (PHV), electric vehicles (EV) and fuel cell vehicles (FCV) (Car air-conditioning compressor)
- *Monozukuri* (manufacturing) using equipment created in-house to produce high-quality products and flexibly accommodate changes in production volume (Car air-conditioning compressor)
- Higher technological capabilities accumulated through the development and production of products for Toyota Motor Corporation (TMC), external sales and internal use (Car electronics)
- Development, production and top-level quality of electronic parts and devices for electrified vehicles (Car electronics)

Opportunities

- Increasing needs for energy-saving products due to stricter environmental regulations and growing environmental consciousness
- Sales expansion in each sector in line with growth of the automobile market

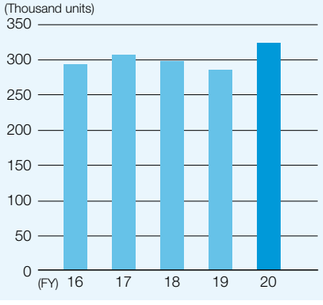
Risks

- Shrinking of the automobile market caused by economic slowdown
- Customers becoming less willing to buy energy-saving products following less stringent environmental regulations
- A drop in product competitiveness due to the yen's appreciation or a rise in raw material costs
- Suspension of production caused by supply chain disruptions

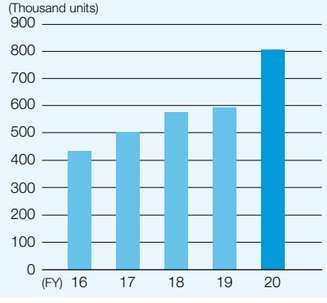
*1: Survey by Toyota Industries Corporation

Net Sales	FY2019	FY2020	Operating Profit	FY2019	FY2020
	¥610.7 billion	¥613.8 billion		¥6.8 billion	¥17.2 billion

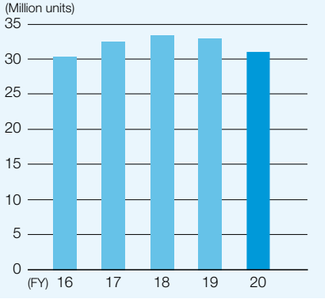
Vehicle Sales



Engine Sales



Compressor Sales



Vehicle

Medium-Term Direction of Business

We will contribute to TMC as a development and production base of compact sports utility vehicles (SUV) by leveraging our comprehensive strengths derived from the highest level of safety, environment, quality, cost and delivery (SEQCD) among all Toyota-affiliated automobile body manufacturers and through greater collaboration within the Toyota Industries Group.

Business Overview in Fiscal 2020

The automobile market remained on par with the previous fiscal year in Japan, but sales declined in other parts of the world.

In fiscal 2020, unit sales increased by 39,000 units, or 14%, over the previous fiscal year to 324,000 units on the back of growing sales of the new RAV4, production of which was launched in November 2018. Net sales also increased by ¥7.5 billion, or 9% year on year, to ¥89.9 billion.

RAV4 Designed, Developed and Produced by Toyota Industries Selected as the Car of the Year Japan

The new Toyota RAV4, TMC's global strategic vehicle that made a comeback to the Japanese market, received the Car of the Year Japan 2019-2020 award for its capabilities as an SUV of the new era to satisfy every need of users at a high level. The RAV4 became the first Toyota vehicle to receive the award in a decade.

Toyota Industries was involved in exterior and interior design and upper-body development of the vehicle and undertakes production of the RAV4. We will continue to pursue vehicle planning and development as well as assure quality in a way to meet the expectations of customers.

Award-winning RAV4

Winning a Minister of Economy, Trade and Industry Award in the 2019 Energy Conservation Grand Prize

The Nagakusa Plant, a vehicle assembly base in Aichi Prefecture, has implemented a comprehensive energy-saving initiative to reduce heat dissipation loss in the drying process of electrodeposited vehicle painting and cut down its annual CO_2 emissions by 391 tons. In recognition of this initiative, Toyota Industries received a Minister of Economy, Trade and Industry Award in the Industrial Field, which is the highest award in the Energy Conservation Grand Prize program (Energy Saving Projects Category) run by the Energy Conservation Center, Japan, in 2019.

We believe that the initiative was an excellent accomplishment for successfully improving the painting process that accounts for about 60% of the plant's total CO_2 emissions. It also has the added effectiveness as it could be applied to other plants, including the Takahama Plant producing materials handling equipment. We will continue to undertake activities to eliminate the wasteful use of energy through focused investigation and analysis.

Toyota Industries representative receiving the award from METI State Minister Hideki Makihara

Receiving an Excellent Karakuri Kaizen Award

At the Karakuri KAIZEN*2 Exhibition 2019 hosted by the Japan Institute of Plant Maintenance, a project of Toyota Industries was selected among 454 projects of 110 companies and received an Excellent Karakuri Kaizen Award. The project, undertaken by the Painting Section of the Manufacturing Department in the Vehicle Division, was recognized for its safe, secure and comfortable *karakuri* mechanical device that resolves problems facing painting operators and suppliers in relation to the 3Ms (*muri*, *mura* and *muda*: literally translated as overburden, unevenness and waste).

*2: Achieving *kaizen* (improvement) at low cost by *karakuri* (Japan's traditional, non-powered mechanical systems that utilize gravity, the principle of leverage, etc.)

Two Toyota Industries' representatives receiving the award (on the right)

Engine

Medium-Term Direction of Business

In line with more stringent environmental regulations adopted globally, there is a growing demand for engines with even greater fuel efficiencies and cleaner emissions. Amid this environment, we aim to pave the way to the era of zero emissions by pursuing the further evolution of internal-combustion engines and developing new, globally top-level technologies and products that also respond to car electrification.

Business Overview in Fiscal 2020

Thanks to the growth in sales of engines, including new A25A and M20A gasoline engines, unit sales in fiscal 2020 totaled 807,000 units, an increase of 214,000 units, or 36%, over the previous fiscal year. Net sales increased by ¥14.0 billion, or 13% year on year, to ¥122.4 billion.

Highly Acclaimed by Customers Worldwide

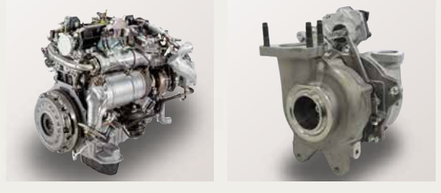
Diesel Engines for Automobiles

Toyota Industries' diesel engines are mounted in a variety of Toyota vehicles, including the Toyota Land Cruiser series, the world's renowned full-fledged four-wheel drive (4WD) model, and TMC's Innovative International Multipurpose Vehicle (IMV) series targeting emerging countries. Their high performance and reliability have gained strong market recognition. Currently, our mainstay products are in-line 4-cylinder GD diesel engines and V-type 8-cylinder VD diesel engines. GD diesel engines equipped with a turbocharger specifically and optimally designed and manufactured in-house are manufactured in Japan and by Toyota Industries Engine India Pvt. Ltd. (TIEI), a consolidated subsidiary in India.

TOPIC

Launched Production of a New Turbocharger Realizing Higher Output of GD Diesel Engine

In March 2020, Toyota Industries launched production of a new turbocharger that realizes higher output of the Toyota GD diesel engine to be mounted on such vehicles as TMC's IMV series sold across the world. The new turbocharger provides considerably better performance through the adoption of new technologies, such as a ball bearing-type system and a newly designed impeller and turbine wheel, and has successfully achieved a dramatic increase of around 15% in the output of the engine without changing its basic components. We will continue to improve the basic performance of our turbochargers and offer diesel engines with even greater competitiveness.



High-output GD diesel engine and new turbocharger

Gasoline Engines for Automobiles

Our Toyota New Global Architecture (TNGA)*3 gasoline engines, namely the 2.5-liter A25A and 2.0-liter M20A, are mainly fitted in the RAV4 manufactured at the Nagakusa Plant in Aichi Prefecture. Developed based on the TNGA concept, these engines offer both excellent driving performance and environmental performance. Responding to the advancement of car electrification, we have also added an HV version of the A25A engine to our lineup.

We will improve product quality and productivity further and contribute to the creation of "ever-better cars" by TMC both through diesel engines and gasoline engines.

2.5-liter A25A engine for HVs

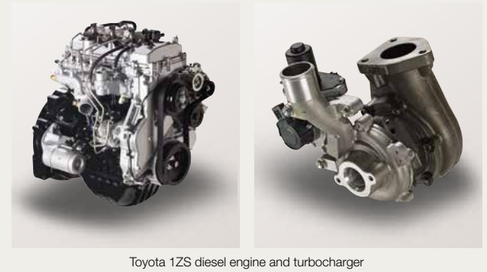
*3: Development policy and method for vehicle creation based on a modular platform

Engines for Use in Industrial Fields

Toyota Industries' engines are highly renowned for their reliability and excellent environmental performance in industrial fields as well. These engines are used for a wide variety of applications, including our lift trucks, and adopted by many customers such as GHP*4 manufacturers in Japan and CHP*5 manufacturers worldwide. These engines offer downsized displacement compared with conventional models with equivalent output, resulting in higher fuel efficiency, cleaner emissions and a reduction in size.

*4: Short for gas heat pump; air conditioner driven by a gas engine
*5: Short for combined heat and power; co-generation system

Web
Link to product details.



Toyota 1ZS diesel engine and turbocharger

Seeking Engines with Greater Product Appeal

Following the Paris Agreement adopted in December 2015 at the 21st session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP21), and with some countries announcing their shift from internal-combustion vehicles to electrified vehicles, there has been a growing need for engines with even greater fuel efficiency and cleaner emissions for HVs, PHVs and other

electrified vehicles as well.

Diesel engines, on the other hand, enjoy an enduring popularity particularly as a power unit suited for SUVs and such commercial vehicles as pickup trucks, as they offer excellent basic performance of high fuel efficiency and high torque at low speed.

Aiming for further evolution of internal-combustion engines, we will continue to seek the world's highest-level combustion efficiency and develop more fuel-efficient and cleaner engines.

Car Air-Conditioning Compressor

Medium-Term Direction of Business

In the Car Air-Conditioning Compressor Business, we will leverage our core compression technology and become an innovative component supplier in a future society where car electrification and the use of autonomous technology are expected to advance rapidly.

In the field of car air-conditioning compressors, we will further enhance our capability to develop products that offer excellent fuel efficiency, quieter operation, compactness, light weight and ease to mount on vehicles. In addition, with the aim of satisfying needs of a broader variety of customers, we will utilize our accumulated technologies to expand our development domain into core components for drive systems.

Business Overview in Fiscal 2020

In fiscal 2020, unit sales of car air-conditioning compressors decreased 1.95 million units, or 6%, from the previous fiscal year to 31.03 million units. Despite an increase in sales in Japan, unit sales were negatively affected by lower sales in North America and Europe due primarily to the impact of the COVID-19 pandemic. Net sales were down ¥18.1 billion, or 5%, from the previous fiscal year to ¥328.1 billion.

Development Efforts Centered around Energy Savings and Car Electrification

Even though growth in the car air-conditioning compressor market is currently slowing down due to weak sales of automobiles, we expect continued growth over the medium term on the back of the expanding automobile market and an increase in the number of vehicles fitted with an air conditioner. The market of electrified vehicles, in particular, is expected to accelerate growth gradually in and after 2020 as automakers roll out new models. In order to reinforce our development and production structures, we will channel resources into both types of compressors, namely compressors for internal-combustion vehicles, which are still mainstay products for the time being, and compressors for electrified vehicles, for which we anticipate stronger demand over the medium to long term.

More stringent fuel efficiency standards have been enforced across the world, pushing the need for higher fuel efficiency both for internal-combustion vehicles and electrified vehicles. Our variable-displacement type compressors for internal-combustion vehicles, which are renowned for high fuel efficiency and reduced weight, have been adopted by the world's leading automakers, including Toyota Motor Corporation, Daimler AG, General Motors Company (GM), Volkswagen AG and Hyundai Motor Company.

In the United States, our SES series became the first compressor*6 to be approved under the country's off-cycle credits program. The program gives off-cycle credits to technologies that can effectively improve fuel efficiency under its emissions regulations. We have since been working to increase the number of models equipped with the SES series compressors.

For electric compressors, we are differentiating their performance by leveraging our original evaluation and analysis techniques and know-how. Specifically, we are working to add even greater competitiveness to our products. Efforts include improving efficiency that affects the driving range of electrified vehicles; adopting countermeasures against electric waves specific to electrified vehicles; and achieving quieter operation. We are also augmenting our support capabilities for automakers through our solution offering to solve diverse noise and vibration issues of the entire vehicle. Besides Toyota, Ford Motor Company, Renault S.A.S., Honda Motor Co., Ltd., Nissan Motor Co., Ltd. and other automakers, which are already using our electric compressors in their respective HVs, PHVs and EVs, we will continue to ramp up our efforts to expand sales to other automakers around the world.

*6: Survey by Toyota Industries Corporation

ESB20 electric compressor

Developing Next-Generation Products

Following car electrification and widespread use of autonomous driving technology, there has been a growing need to cool electronic devices, batteries and other key heat-emitting components. In response, we are developing compressor models with increased cooling capability in order to use their cooling function not only for vehicle interior air conditioning but also for key components. Additionally, we are making our electric compressors compatible with varying voltage and capacity needs and increasing their reliability through multifaceted evaluations using our evaluation facilities created in-house and a test driving course.

Besides this cooling functionality, we intend to utilize our core technologies to expand our business domain into components for drive systems. Currently, we engage in production of an oxygen-supplying air compressor and hydrogen circulation pumps for FCVs and are promoting development of next-generation products.

Establishing Stronger Global Production and Supply Structures

Currently, the car air-conditioning compressor market remains unstable due to weak automobile sales, even though growth is expected over the medium term. The move toward more stringent fuel efficiency regulations and car electrification has also prompted the possibility of fluctuating demand for compressors both for internal-combustion vehicles and electrified vehicles. In response, we are building a production structure less vulnerable to changes in production volume through such measures as automating our plants to save labor and implementing flexible shifts in production operations. Meanwhile, we expect the rapid spread of electrified vehicles in China driven by the country's new energy vehicles (NEV) regulation*7. Accordingly, we will promote the local production of electric compressors to capture booming demand.

*7: Regulation in China mandating automakers to produce a certain percentage of EVs and other new energy vehicles

Increasing Competitiveness by Creating Production Facilities In-House

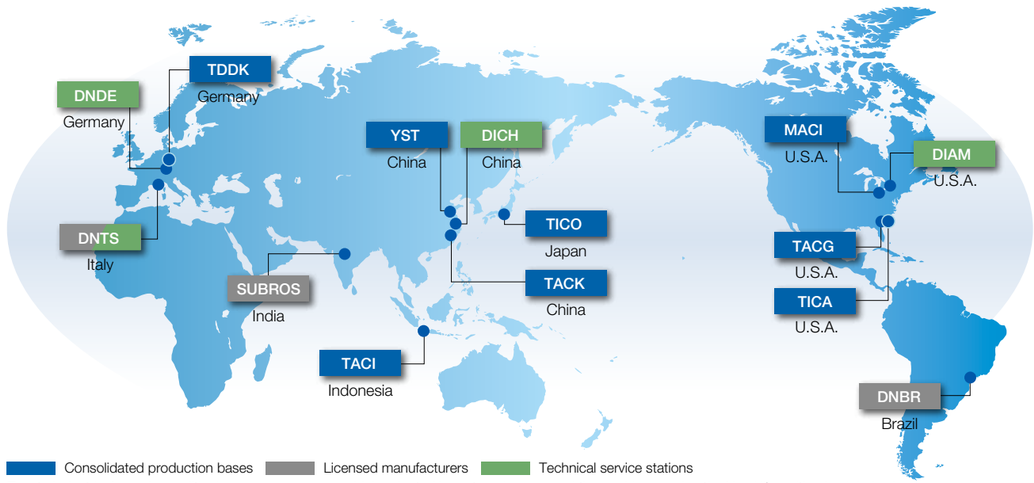
Achieving high levels of fuel efficiency and reliability requires high-precision processing technologies for compressors for both internal-combustion vehicles and electrified vehicles. Toyota Industries realizes high-speed and high-precision machining by leveraging its know-how accumulated through responding to the stringent demands of automakers worldwide and by developing devices from processing machines to associated cutting tools in-house. With the aim of increasing our production efficiency further, we have also set up a system that allows design and production engineering departments to work as one team to design mixed production lines to manufacture a wide variety of products while increasing production capacities in a phased manner.

TOPIC

Since launching the world's first mass production of electric compressors in 2003, Toyota Industries has maintained the world's top share*8 for electric compressors and manufactured approximately 20 million units to date. Previously, we had manufactured these compressors only in Japan, but in response to the growing demand in China, initiated local production at TD Automotive Compressor Kunshan Co., Ltd. (TACK) in March 2020. There is also a plan to launch production at Yantai Shougang TD Automotive Compressor Co., Ltd. (YST) in the future. By installing production lines that have been refined for higher quality and productivity at a mother plant in Japan to bases in China, we will ensure stable production at a high quality level.

*8: Survey by Toyota Industries Corporation

Worldwide Bases of Car Air-Conditioning Compressors (As of March 31, 2020)



Toyota Industries' car air-conditioning compressors are widely adopted by automakers around the world, garnering the No. 1*9 position in global sales.

*9: Survey by Toyota Industries Corporation

Car Electronics

Medium-Term Direction of Business

Car electrification is steadily progressing in keeping with the enforcement of more stringent environmental regulations and growing energy-saving consciousness among customers. The Electronics Division will contribute to car electrification in a broad range of fields, from offering on-board power source devices to improving social infrastructure through the provision of charging stands and systems to feed electricity externally.

Business Overview in Fiscal 2020

Net sales of car electronics products expanded, primarily supported by sales of DC-DC converters and on-board chargers mainly to TMC.

Contributing to Car Electrification

Toyota Industries develops not only DC-DC converters, on-board chargers and AC inverters in the field of on-board power source devices but also rear inverters in the field of core components for drive systems and charging stands. In addition to TMC, we are promoting new business to other automakers across the world.

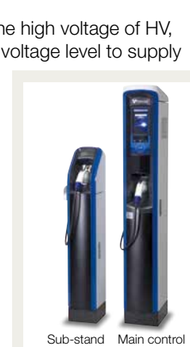
DC-DC converter

On-board charger

A DC-DC converter converts the high voltage of HV, PHV and EV batteries into a lower voltage level to supply power to standard electrical devices such as lights and wipers. Our DC-DC converters are fitted in the Prius, Aqua and other major electrified vehicles. By utilizing such technologies as the world's first thick copper substrate*10, we have reduced the volume and weight of the product. In December 2019, we also started production of a DC-DC converter for the new Yaris.

An on-board charger converts AC voltage from the power grid into DC voltage of high-voltage batteries in vehicles and is necessary for charging EVs and PHVs, for which the market is expected to expand in the future. We offer chargers compatible with a wide range of voltages to enable their use in various parts of the world.

In addition, we have been contributing to the advancement in car electrification by developing a rear inverter for electric 4WD vehicles and public charging stands for PHVs and EVs.



Sub-stand Main control stand

Charging stand for PHVs and EVs

Use of an Electrified Vehicle as a Power Source

In recent years, there has been a growing public attention to the use of high-capacity batteries of electrified vehicles as a power source.

Toyota Industries recognized early on the use of electricity stored in vehicle batteries as a power source and developed an on-board AC inverter in 1995. It was the world's first model*10 to be mounted on a vehicle while in production. Since then, production volume has been increasing and reached a cumulative total of 30 million units in June 2019.

The 1.5-kW type, in particular, can operate appliances that require more power, such as rice cookers and hot plates, and has drawn much attention as an emergency power source in a disaster in addition to camping, outdoor events and other applications. Immediately following Typhoon Faxai in 2019, many vehicles fitted with this inverter were put to use across Japan to supply electricity during prolonged power outages.

1.5 kW AC inverter

We will continue to promote the development of inverters as a key component that adds new value to electrified vehicles, along with other products such as vehicle-to-load (V2L) systems*11 capable of supplying a large amount of electricity.

*10: Survey by Toyota Industries Corporation
*11: Systems and equipment designed to use the power accumulation and generation capabilities of HVs, PHVs, EVs and FCVs to feed power to electric appliances

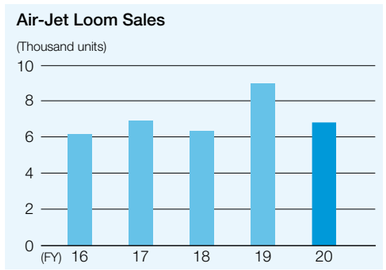
TMC's SORA FC bus and V2L

Textile Machinery

Carrying on the philosophy of founder Sakichi Toyoda, which reflects his strong commitment to manufacturing, Toyota Industries responds to a broad range of needs with its extensive product lineup, from air-jet looms, for which we enjoy the world-leading market share* in unit sales, to ring spinning frames and roving frames.

* Survey by Toyota Industries Corporation

Web
Link to product details.



Strengths

- Broad product lineup both in the spinning and weaving machinery fields
- World-leading market share* in unit sales of air-jet looms
- Global, well-developed service network
- Ability to develop products that excel in reliability, energy-saving performance and versatility

Opportunities

- A rise in textile demand in line with an increase in the world population
- Further increasing applications in industrial textile products
- Increasing need for high-quality and highly functional yarn and textile products, following the economic growth of emerging countries

Risks

- Changes in each government's policies concerning promotion of the country's textile industry
- Weaker sales due to intensifying competition
- A decline in capital investment due to economic slowdown and raw cotton and/or yarn price fluctuations

	FY2019	FY2020
Net Sales	¥76.3 billion	¥61.7 billion
Operating Profit	¥7.3 billion	¥2.9 billion

Medium-Term Direction of Business

With growing environmental consciousness worldwide, needs are expected to increase further for textile machinery offering superior environmental performance. Toyota Industries' products are highly acclaimed by customers for their excellent reliability and productivity as well as energy-saving performance. We will continue to develop energy-saving and other innovative technologies and seek to achieve further growth and evolution as a leading manufacturer of textile machinery.

Business Overview in Fiscal 2020

The textile machinery market was weak in Asia, including China, our primary market. Unit sales of air-jet looms decreased 2,200 units, or 24% year on year, to 6,800 units. Combined with a decrease in sales of quality measurement instruments for fiber, yarn and fabric, net sales were down ¥14.6 billion, or 19%, from the previous fiscal year to ¥61.7 billion.

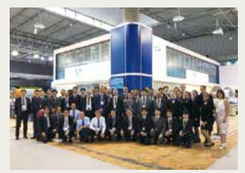
Growing Needs for Air-Jet Looms

Toyota Industries' air-jet looms are adopted by customers in China, India and many other countries. Produced fabrics are used broadly for towels, shirts and other clothing purposes as well as in industrial products such as materials for electronic substrates and vehicle airbags. Recently, an increase in mobile electronic devices has driven the need for fabrics of woven glass fiber for use in electronic substrates, and it is anticipated that applications for air-jet looms will expand further.

Taking Part in the Largest International Textile Machinery Trade Show in the World

In June 2019, Toyota Industries participated in ITMA 2019 international textile machinery trade show held in Barcelona, Spain.

We exhibited the JAT810 air-jet loom, for which we enjoy the world's top share in unit sales, and demonstrated high-speed weaving of complex-patterned fabrics using our original electronic shedding device. We also showcased our next-generation air-jet loom that captures the future needs of textile plants for automation, use of IoT and environmental response. These products received favorable feedback from many visitors. At the booth of Uster Technologies AG, a Switzerland-based consolidated subsidiary manufacturing quality measurement instruments for fiber, yarn and fabric, we exhibited the latest measurement instruments, which drew much attention from visitors. Through various textile machinery exhibitions, we will continue to appeal to customers our technological capability to meet their needs and reinforce our brand strength.



Staff who participated in the trade show

Uster's booth