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

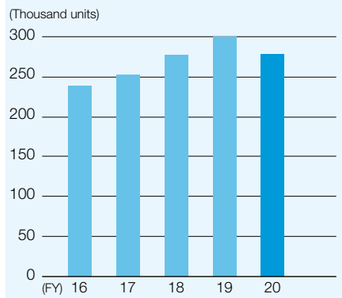
- An expansion of global logistics volume in line with an increase in the world population and economic growth
- Growing need for products with high energy savings and low environmental impact following enforcement of more stringent environmental regulations around the world
- Growing need for electric 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.

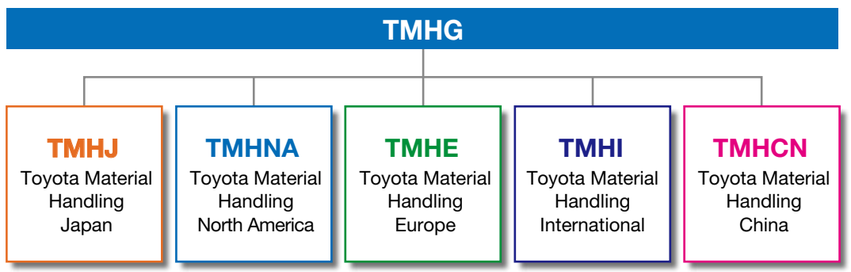
Toyota Advanced Logistics Group (TALG)

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.

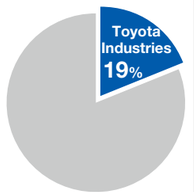
Toyota Material Handling Group



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

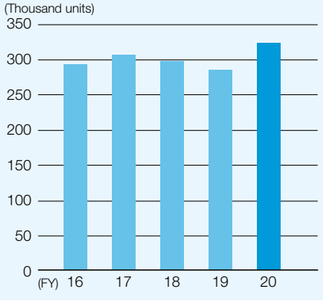
Risks

- 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

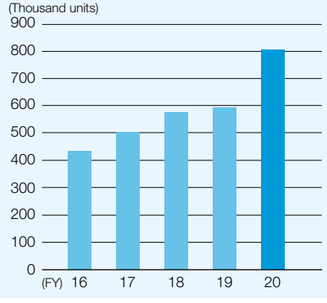
*1: Survey by Toyota Industries Corporation

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

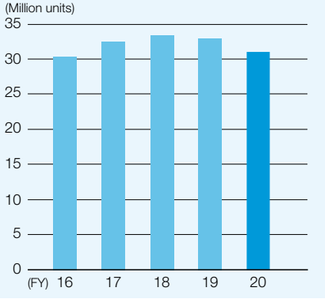
Vehicle Sales



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

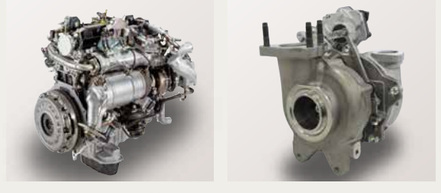
Diesel Engines for Automobiles

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

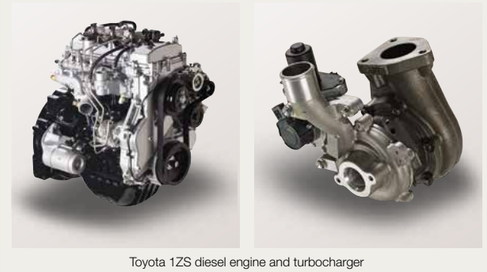
*3: Development policy and method for vehicle creation based on a modular platform

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

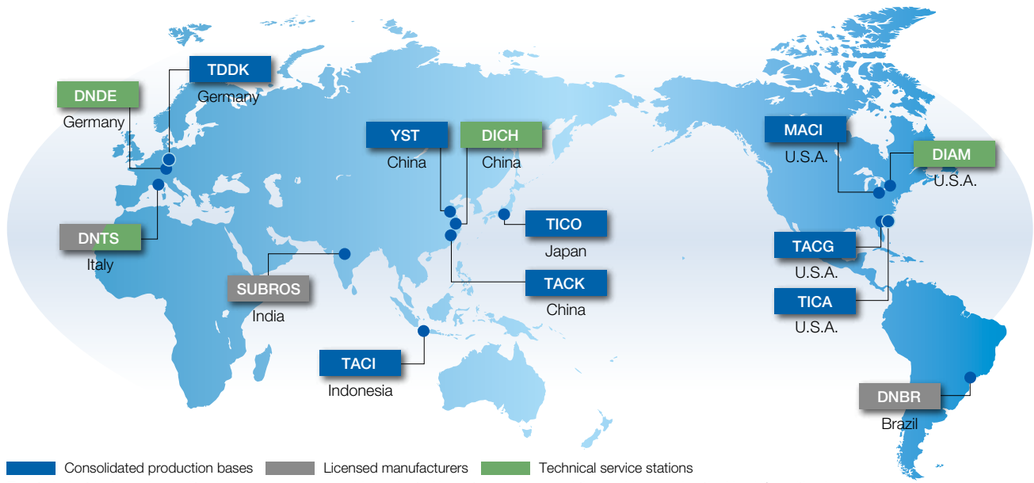
Achieving high levels of fuel efficiency and reliability requires high-precision processing technologies for compressors for both internal-combustion vehicles and electrified vehicles. Toyota Industries realizes high-speed and high-precision machining by leveraging its know-how accumulated through responding 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.

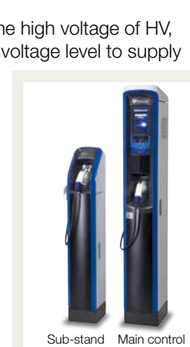
DC-DC converter

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

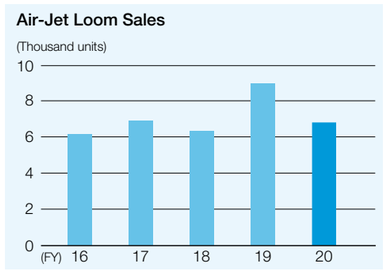
TMC's SORA FC bus and V2L

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.

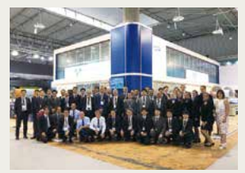
Growing Needs for Air-Jet Looms

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