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# **Materials Handling Equipment / Logistics**

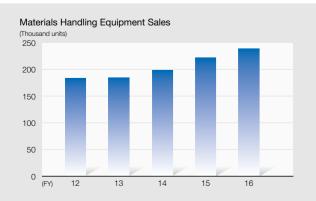
#### **Materials Handling Equipment**



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

#### **Business Overview in Fiscal 2016**

In the materials handling equipment market, an increase in sales in Europe, North America and Japan compensated for weaker sales in China and drove continued growth globally. Based on the conditions of respective markets, Toyota Industries augmented its production and sales activities and launched new products. As a result, unit sales of our mainstay lift trucks for fiscal 2016 increased 17,000 units, or 7%, to a total of 239,000 units over the previous fiscal year. Also, in a bid to expand our business domains, we acquired the lift truck business of Taiwan-based Tailift Co., Ltd. and the sales financing operations for materials handling equipment in the United States. Consequently, net sales increased ¥79.2 billion, or 9%, to ¥1,004.1 billion.



### Global Business Development Led by Toyota Material Handling Group (TMHG)

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

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

#### **Business Activities in Fiscal 2016**

The lift truck market in 2015 sustained growth primarily in developed countries. Amid this environment, we carried out sales expansion activities for remodeled internal-combustion lift trucks and electric lift trucks, while offering solutions designed to achieve greater logistics efficiencies, enhancing responsiveness to large-order customers and ensuring reliable after-sales services.

To increase our presence in emerging countries, we acquired the lift truck business of Taiwan-based Tailift Co., Ltd. in August 2015. Capitalizing on Tailift's strengths, we aim to expand sales in emerging countries where market expansion is expected over the medium to long term.

■ Toyota Material Handling Group Brands

was established in the United States with the aim of strengthening our sales financing operations for materials handling equipment, commenced operations in October 2015. In order to respond to customers' needs for the lease and rental of materials handling equipment, TICF will strive to strengthen its value chain, from sales of new equipment to maintenance services during the lease period and sales of used equipment after the expiration of the lease contract. We plan to extend our reach to Europe, Asia and other regions and reinforce our sales financing operations on a global scale.

As for the Logistics Solutions Business, which is

Toyota Industries Commercial Finance, Inc. (TICF), which

As for the Logistics Solutions Business, which is represented by automated storage and retrieval systems and automatic guided vehicle systems, we are working to meet a wide range of needs by providing consulting services for customers' logistics-related issues as well as assisting them with installation and operation of equipment. In the e-commerce industry, which has been growing in recent years, we have been proactively making various proposals and successfully acquiring new orders.

In the field of aerial work platforms, sales of Aichi Corporation, which possesses the top brand\*1 in this field in Japan, were negatively affected by a cutback in capital investment by the telecommunication industry. On the other hand, sales grew in line with rises in demand for the replacement of aging facilities in the

replacement of aging facilities in the electric power industry, demand for construction and such social infrastructure work as tunnel and bridge inspections in the leasing industry as well as demand for mechanization in the railway industry. Thus, overall sales of aerial work platforms increased, and Aichi posted sales exceeding the previous fiscal year's level.

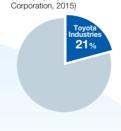
\*1: Survey by Aichi Corporation

al work

Aichi Corporation's aerial work platform

#### ■ Toyota Industries' Global Lift Truck Market Share

(Survey by Toyota Industries



\*2: ALOMA stands for Asia, Latin America, Oceania, Middle East and Africa

### **Japanese Market**

### No. 1 Market Share in Lift Truck Unit Sales for the 50th Consecutive Year

In Japan, growing environmental consciousness has triggered a drastic change in the lift truck market. Based on the keywords of 3Es (Energy, Environmental protection and Ecological thinking), we promoted sales of the new GENEO internal-combustion lift trucks equipped with our own engines with greater environmental performance. We also introduced the remodeled GENEO-Ecore compact electric lift truck fitted with our originally developed highly efficient AC motor that significantly reduces overall power consumption. Through these efforts, we offer products precisely matched to customers' needs. As a result, unit sales in fiscal 2016 increased 4% year-on-year to 40,000 units. Toyota Industries achieved a share of 46.8% in the Japanese market and maintained its top position\*3 for the 50th consecutive year.

\*3: Surveys by Japan Industrial Vehicles Association and Toyota Industries Corporation,



New GENEO-Ecore electric lift truck (released in October 2015)

### Promoting Feasibility Test of Fuel Cell (FC) Lift Truck

Since October 2015, Toyota Industries has been conducting a feasibility test of its FC lift truck in a local wholesale market under a project hosted by Shunan City, Yamaguchi Prefecture. The test verifies the FC lift truck's ability to achieve "Well to Wheel\*4" CO2 emissions reduction under usage conditions that differ from factories and airports and a degree of operational improvement resulting from its use. We have also been engaging in a feasibility test of our FC lift truck in the international cargo area of Kansai International Airport since February 2015 and added two new practical-use models for the test in 2016. The models are equipped with an FC system newly and specifically developed for lift

trucks, which uses the same fuel cell used in the MIRAl fuel cell vehicle released by Toyota Motor Corporation (TMC). We plan for possible release of this FC lift truck during fiscal 2017.

\*4: From extraction of fuel raw materials to operation of lift trucks



FC lift truck

### **Initiative to Achieve Greater Customer Satisfaction**

To further upgrade services to customers, we held the 4th Service Skills Contest in November 2015, in which a service representative from the 40 dealers across Japan participated. Through this contest, we aim to improve our servicing capabilities and raise awareness among service staff in order to provide services that bring even greater satisfaction to customers.



Service Skills Contest

#### **North American Market**

#### **Maintaining Top Market Share**

In the expanding North American lift truck market, Toyota Industries remained the market share leader\*5 in 2015 with combined unit sales of TOYOTA and RAYMOND brands of

approximately 86,000 units, up 16% from the previous fiscal year.

Toyota, as a full-line supplier of lift trucks, remained the market share leader\*5 for the 14th consecutive year, and Raymond continued to hold its number one\*5 market share position in narrow aisle electric lift trucks.

\*5: Survey by Crist Information & Research, LLC, 2015

## **Expanding Product Lineup and Strengthening Brand Appeal**

Toyota expanded its product offering with the launch of five electric lift trucks and one internal-combustion lift truck. In response to high levels of needs for logistics solutions, Toyota released into the market the newly developed T-Matics vehicle management system. T-Matics helps increase efficiency and uptime by allowing operators to easily track current usages and use collected data.



T-Matics vehicle management system

Raymond introduced models that improve operations efficiency and energy-saving performance. They include the Raymond Model 6210 Walkie Straddle Stacker, which stores pallets up to three levels high, and the Raymond Model 7310 Reach-Fork truck with unique four-directional travel capabilities. Both models contribute to greater efficiency in customer operations and work space. The Raymond Model 8210 Walkie Pallet Truck enables use in wider applications thanks to dust- and water-proof protection of electronic devices.



Raymond 7310 Reach-Fork truck

In addition, both Toyota and Raymond implemented a new marketing strategy to strengthen their respective brands, including re-designed websites and new sales and marketing materials.

#### **Reinforcing Quality and Production Functions**

In fiscal 2016, Toyota celebrated 25 years of manufacturing lift trucks in North America. Throughout these years, Toyota has been committed to manufacturing operations with an emphasis on quality to satisfy our customers and received a number of awards, including 2015 Supplier of the Year from United Rentals, Inc., the largest equipment company in the world, in recognition of its product and service quality. On another front, Toyota consolidated the manufacturing and support functions into one large space. The project is designed to enhance communication between employees and repurpose factory floor space for improved manufacturing processes.



2015 Supplier of the Year awarded by United Rentals, Inc.

While working to raise product quality, Raymond has been carrying out various improvement activities at its production site and headquarters. Prime examples include the reconfiguration of manufacturing space and the upgrade of its warehouse management software by applying the Toyota Production System (TPS).

#### **Further Solidifying Our Leadership Position**

The North American lift truck market is expected to show continued growth in 2016. Toyota and Raymond will continue to provide innovative products, excellent customer service and solutions to our customers while focusing on the areas of automation, telematics and others. Through these initiatives, we aim to further solidify our leadership position.

### **European Market**

#### Capturing Favorable Market Conditions to Expand Unit Sales

Except for Russia and some other countries, European economies in fiscal 2016 registered mild growth, and the lift truck market expanded from the previous year. Amid these conditions, Toyota Industries posted sales of 75,000 units, up 9% from the previous fiscal year.

### **Continuing to Offer Attractive Products and Logistics Solutions**

Toyota Industries proactively launched a series of new products to meet various customer needs. In fiscal 2016, we introduced the BT Staxio P-series, which helps alleviate the burden on operators arising from long transport distances within large distribution centers. The series includes 11 platform stackers offering the right model for

each application. The new electric counterbalanced lift truck Toyota Traigo 48 was also introduced. offering classleading energy efficiency while being highly productive in limited spaces and featuring a shorter turning radius to contribute to raising customers' logistics efficiencies.



Toyota Traigo 48 electric lift truck

In addition to low lift trucks, the lithium-ion range of electric lift trucks was expanded to include reach lift trucks and towing tractors. Lift trucks with lithium-ion batteries are 30% more energy-efficient than lead-acid batteries, significantly reducing CO<sub>2</sub> emissions as well as energy costs. Besides offering new products, we proactively make logistics solutions proposals, such as the introduction of fleet management systems, thereby contributing to more efficient overall logistics of customers.

#### **Sales Promotion Initiatives**

Each sales and marketing company in Europe actively organized and participated in sales promotional events in the market. In the Netherlands, we took part in Logistica, the country's largest trade fair held every three years, and welcomed approximately 1,200 visitors at the booth where we promoted our products and logistics solutions. In other countries, we appealed product offerings by organizing a customer event and other activities.

Prior to the upcoming CeMAT Fair, a press preview conference was held in February 2016 in Hanover, Germany, inviting 100 journalists from 22 European countries. Under the theme for CeMAT 2016, "think CeMAT, think Toyota," we highlighted a wide range of product offerings and logistics solutions as well as our dedicated initiatives to improve quality.



Toyota Industries booth at CeMAT 2016

In October 2015, the used trading facility in Antwerp, Belgium, was opened. Dealers from all over the world have the opportunity to buy used Toyota lift trucks from one single source from wide product offerings. In Germany, an online shop was launched as a new sales channel, which raises customer convenience by enabling quick order placement of spare parts, and already indicates incremental business opportunities.

#### **Continuing to Accurately Meet Customer Needs**

The lift truck market in Europe in 2016 is anticipated to be on par with 2015. Amid this backdrop, we will stay focused and listen to customers. We will also continue investment in R&D to offer products and logistics solutions that capture market needs and contribute to improving customers' materials handling operations with the aim of becoming No. 1 in Europe.

#### **ALOMA\* and Chinese Markets**

### **Engaging in Sales Expansion Activities amid Slowing Markets**

Toyota Industries covers the ALOMA markets of 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 and RAYMOND brands.

In 2015, the market uptrend enjoyed during recent years took a downturn, resulting in stagnation in both markets. Amid this market condition, unit sales decreased 9% compared with the previous fiscal year to 38,000 units. Increased efforts for sales expansion, however, have been successful in keeping market share virtually unchanged.

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

#### **Initiatives in Major Markets**

Toyota Material Handling India Pvt. Ltd. is working to strengthen its sales network in India. In 2015, a new sales office and parts warehouse were opened in Gujarat to improve its customer service capabilities. Parts warehouses were also opened in Chennai and Pune to be closer to customers and deliver parts more quickly.

Toyota Material Handling Australia Pty Limited (TMHA) covers the entire Australian region with fully captive sales, service and rental finance service branch operations offering TOYOTA, BT and RAYMOND brands. Through these efforts, TMHA expanded unit sales, although the market showed signs of a decline in 2015. TMHA will continually enhance sales activities to further meet customers' needs.



Participants of service skills contest in Australia

In Brazil, amid a slowing economic condition, Toyota Material Handling Mercosur Indústria e Comércio de Equipamentos Ltda (TMHM) stepped up company-wide sales expansion activities primarily in strategic areas while working to improve the local procurement ratio of parts for internal-combustion lift trucks that TMHM manufactures.

In Argentina, TMHM held the annual Dealer Convention in September 2015 in Buenos Aires. A total of 16 dealers participated, including two newly assigned dealers from Bolivia and Paraguay, and actively engaged in discussions regarding sales policies and strategies in the region.



Dealer Convention in Buenos Aires

In Singapore, Toyota Material Handling Marketing Asia Pacific Pte. Ltd. (TMHMAP) was established in 2015 and replaced the previous Asia Regional Office in Singapore to strengthen the relationship with distributors in the Asia and Pacific region. TMHMAP continuously works closely with distributors in an effort to raise its responsiveness in terms of sales and after-sales services and to meet customer expectations.

In China, amid rising needs for electric lift trucks, we worked to strengthen the sales structure of electric lift trucks at Toyota Material Handling (Shanghai) Co., Ltd. and further reinforce the sales and service networks in principal regions. We are also promoting cooperation with Tailift, which became a subsidiary of the Toyota Industries Group in August 2015, and considering strategies to create synergies.

### Providing Reliable Support to Customers' Logistics Efficiencies

While 2015 showed a decrease in demand for lift trucks in the ALOMA and Chinese markets, growth is expected to remain weak during 2016. Amid this prospect, we will continue to strive for providing reliable support to improve customers' logistics efficiency by capturing the needs of both new and existing customers regardless of the market situation.

#### **TOPICS**

#### **Distributor Conference**

The Distributor Conference held in Nagoya, Japan, in April 2015 was attended by 146 representatives from Toyota, BT and Raymond distributors/dealers spanning 46 countries. The conference included the confirmation of the medium- to long-term vision and specific action plans, and a common approach for future directions was confirmed. Also on the agenda was the awards ceremony for the 2014 Distributor Award Program. During the conference, participants pledged to work harder to achieve objectives based on the slogan "Lift Beyond Together."



Distributor Conference

### Regional Distributor Conferences for Warehouse Trucks

From October to December 2015, we held Regional Distributor Conferences for the ALOMA region with around 50 participants from major distributors. The events took place in Dubai, Jakarta and Santiago, with a focus on the concept of "Increasing Sales of Warehouse Trucks." Presentations by successful distributors confirmed the necessity of having knowledge and functions in place such as proper stock, leasing services and a strong service organization.



Regional Distributor Conferences for Warehouse Trucks

# **Materials Handling Equipment / Logistics**

#### Logistics



Toyota Industries offers customers highly advanced, efficient logistics services through consigned operation of distribution centers and land transportation services.

#### **Business Overview in Fiscal 2016**

Both the logistics services business and the land transportation services business for automotive parts increased. However, as we sold our stakes in two subsidiaries, one engaging in cash collection and delivery and cash proceeds management services and the other in data storage, management, collection and delivery services, net sales in fiscal 2016 declined ¥11.1 billion, or 11%, from the previous fiscal year to ¥86.9 billion.

\* Starting from fiscal 2017, the business for planning, design and operation of distribution centers will be classified into the Materials Handling Equipment Segment while the business of land transportation services will be included in the Others Segment.

### Planning, Design and Operation of Distribution Centers

Toyota Industries operates distribution centers for various industries and customers. During fiscal 2016, operation of existing distribution centers generated a relatively steady logistics volume. In this environment, we strived to strengthen our profit structure through cost improvement activities undertaken at logistics sites based on the thinking embodied in TPS and simultaneously worked to enhance the level of services to customers.

With an aim of optimizing logistics in each customer's entire supply chain, we continue our proactive sales activities by making proposals that leverage the maximum use of the Toyota Industries Group's resources in collaboration with the Materials Handling Engineering Business. In fiscal 2016, we started operating two additional distribution centers for customers mainly in the medical and pharmaceutical industries. In total, we now operate 20 distribution centers under consignment.

Looking ahead, we will continue to facilitate our proactive sales activities for both increasing orders from existing customers and acquiring new customers in industries having high growth potential.

#### **Land Transportation Services**

The Taikoh Transportation Group provides land transportation services under consignment from many automotive parts manufacturers. The group collects finished parts from manufacturers, compiles them by their destination and delivers to automakers "what is needed, when it is needed and in the quantity needed."

During fiscal 2016, despite a slowdown in automobile production in Japan, we acquired a steady logistics volume in the transportation of automotive parts. Under these circumstances, we continued to conduct various profit improvement activities, including the promotion of efficient cargo transport, while at the same time aggressively undertaking activities to ensure safe and environment-conscious operations.

We will continue to further reinforce our sales activities to capture new customers and, ultimately, to expand business operations.



Taikoh Transportation Group's land transportation services

### Sale of Shares of Two Consolidated Subsidiaries

We have been pushing for "concentration and selection" of our operations to focus on businesses that are closely linked to our core businesses in the materials handling equipment and automobile-related fields. As part of this effort, we sold our stakes in two subsidiaries, Asahi Security Co., Ltd. and Wanbishi Archives Co., Ltd., in December 2015. The former was sold to SECOM Co., Ltd. and the latter to Nippon Express Co., Ltd.

In addition to cash collection and delivery services tailored to each customer's specific needs, Asahi Security offers comprehensive services that include management of gift certificates and accounting operations at customers' retail outlets. Furthermore, the company provides security services integrating the monitoring by security devices and dispatch of security guards on a 24/7 basis. Wanbishi Archives provides support to financial institutions and government agencies to ensure the security and efficient use of their information assets. Under its robust security structure, Wanbishi Archives offers a comprehensive range of services covering the entire lifecycle of critical information assets in electronic, paper or other forms, from storage and utilization to destruction.

Both companies have attained a certain level of growth by providing these value-added logistics services to customers and benefited from our support in achieving operational improvements. Nevertheless, in order to make significant growth in the future, we believe that it will be beneficial for them to work with companies that can generate greater business synergies. We decided to sell off our stakes after holding discussions with both companies.

### **Automobile**



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

#### **Vehicle**

#### **Business Overview in Fiscal 2016**

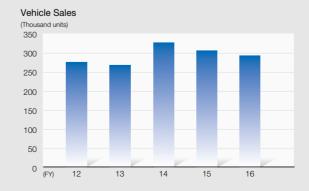
In the automobile industry, market conditions were sluggish in Japan, Latin America and other emerging countries but remained strong in North America.

Consequently, global sales were on par with the previous year.

In fiscal 2016, unit sales of the Vitz (Yaris outside Japan) and the RAV4 declined by 15,000 units, or 5%, from the previous fiscal year to 293,000 units. However, various factors, including the addition of a hybrid version of the RAV4, served to push up net sales by ¥21.0 billion, or 5%, to ¥480.0 billion.

#### Highest-Level SEQCD to Contribute to Production of Attractive Toyota Cars

In recognition of Toyota Industries' comprehensive strengths in vehicle quality, delivery, cost and safety as the highest among all Toyota-affiliated automobile body manufacturers,



from Toyota Motor Corporation (TMC) we have received an award for excellence under the Toyota Quality Control Award program for four consecutive years.

In October 2015, following a minor model change of the RAV4 for markets outside Japan, we initiated production of a hybrid model of the RAV4 in addition to the conventional internal-combustion models. In the face of the shrinking automobile market in Japan, we are further strengthening our already superior level of safety, the environment, quality, cost and delivery (SEQCD). We also are working to leverage our ability to quickly start up production and a flexible structure in terms of vehicle models and production volume to contribute to production in Japan of Toyota vehicles.

#### **Development and Production of Plastic Glazing**

Toyota Industries' plastic glazing panoramic roof has been used on TMC's hybrid vehicle Prius  $\alpha$  (Prius + in Europe and Prius v in North America). This product retains the beautiful surface quality typical of a glass roof yet is approximately 40%\* lighter than its glass counterpart, improving vehicle fuel efficiency and thus contributing to the reduction of CO2 emissions.

Our plastic glazing rear and quarter windows have been adopted on the 86 GRMN, a limited-edition model released by TMC in 2016, and have contributed to achieving a reduction in weight and a lower center of gravity. Moreover, this rear window offers the world's first defogger for a plastic glazing product.

Toyota Industries will continue to develop attractive new products that leverage the distinctive characteristics of plastic glazing.

 $^{\star}$  Survey by Toyota Industries Corporation



Plastic glazing rear window



Plastic glazing quarter window

# "Our Vitz and RAV4" Initiative for Enhancing Appeal of the Two Car Models

As the sole producer of the Vitz in Japan and with the aim of turning the vehicle into a long-selling series, Toyota Industries collaborates with TMC and its dealers to make various suggestions under the banner "Taking the Lead in Making Our Cars More Attractive." Similarly, to boost the appeal of the RAV4, we plan and develop special-edition vehicles that directly reflect the voice of our customers. Through these endeavors, we seek ways to create more appealing and satisfying vehicles for customers worldwide.

At the same time, we also undertake activities to expand our customer base by enhancing the appeal of the Vitz through our support to motorsports events.

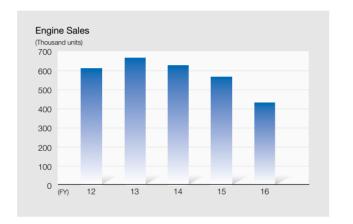


Vitz No. 3 car participating in Rally Toya

**Engine** 

#### **Business Overview in Fiscal 2016**

Despite the launch of production of GD diesel engines, unit sales in fiscal 2016 declined 134,000 units, or 24%, from the previous fiscal year to 434,000 units. This decline was mainly attributable to decreases in sales of KD diesel engines and AR gasoline engines. Net sales dropped ¥33.8 billion, or 18%, from the previous fiscal year to ¥158.2 billion.



### Toyota Industries' Diesel Engines Highly Acclaimed by Customers Worldwide

Toyota Industries' diesel engines, mounted in a variety of Toyota vehicles sold around the world, have gained high market recognition for their clean emissions, fuel efficiency and high performance. The V-type 8-cylinder VD diesel engine is installed in the Land Cruiser for markets outside Japan, including Australia, Russia and the Middle East. As a successor model of KD diesel engines, we commenced production of GD diesel engines in June 2015. These engines, which are installed in TMC's Land Cruiser Prado and other vehicles, are equipped with a turbocharger, for which we participated in the development and started production in-house, and boast significantly higher performance.

As part of efforts to increase the production of GD diesel engines, an additional production line went into operation in January 2016 at our Hekinan Plant



GD diesel engine

TOPIC

Toyota Industries participated in Tokyo Auto Salon 2016, held from January 15 to 17, 2016, to showcase its concept car for the first time to the public. Many visitors were pleased with its unique, flowing contour and wanted it to be introduced into the market as it is.



Concept car on display

in Aichi Prefecture to manufacture the turbocharger to be mounted on GD diesel engines. In March, Toyota Industries Engine India Pvt. Ltd. (TIEI), a consolidated subsidiary in India engaging in the manufacture of engines, also initiated production of GD diesel engines.

#### Developing Competitive Diesel and Gas/ Gasoline Engines in Non-Automotive Fields

Toyota Industries' engines are highly renowned for their excellent environmental performance in non-automotive fields as well. These engines are used for a wide variety of applications, including our lift trucks, and adopted by GHP\*1 manufacturers in Japan and CHP\*2 manufacturers worldwide

We expanded our lineup of industrial engines with the addition of the Toyota 1KD industrial diesel engine, which is equipped with a turbocharger developed in-house, and the Toyota 1FS gas/gasoline engine in March 2013, followed in December 2013 by the Toyota 1ZS industrial diesel engine also equipped with a turbocharger developed in-house. These three new engines offer downsized displacement compared with conventional models with equivalent output, which results in higher fuel efficiency, cleaner emissions and a reduction in size.

- \*1: Short for gas heat pump; air conditioner driven by a gas engine
- \*2: Short for combined heat and power; co-generation system

#### For the Creation of Better Engines

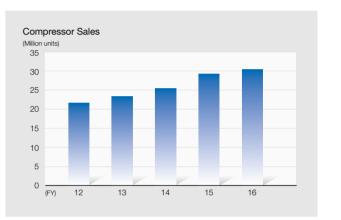
Fuel efficiency and emissions standards are becoming more and more strict, as called for in the twenty-first session of the Conference of the Parties (COP21) held in Paris, France, in November 2015 and as evidenced by India imposing increasingly severe regulations on diesel engines. Even before such trends became prevalent, Toyota Industries has been carrying out development of next-generation automobile engines that can clear Euro 6 and other stringent emission standards, as well as engines for materials handling equipment and general purposes featuring greater fuel efficiency and lower costs. In November 2014, TMC and Toyota Industries agreed to gradually consolidate diesel engine development and production functions into the operations of Toyota Industries. Accordingly, we will step up our efforts to achieve shorter development cycles with improved efficiency in order to develop and produce diesel engines with greater competitiveness.

For our general-purpose engines, we will plan, develop and produce a lineup of products matched to customers' needs while actively promoting sales activities.

#### **Car Air-Conditioning Compressor**

#### **Business Overview in Fiscal 2016**

In fiscal 2016, unit sales of car air-conditioning compressors rose 1.05 million units, or 4%, over the previous fiscal year to 30.37 million units as a result of an increase in sales in North America, Europe, China and other regions. Net sales rose ¥18.0 billion, or 6%, over the previous fiscal year to ¥342.6 billion.



#### Development Efforts Based on 3Es (Energy, Environmental Protection and Ecological Thinking)

More stringent fuel efficiency standards have been enforced in North America, Europe, Japan and China, requiring automobiles to provide extremely high fuel efficiency performance.

Against this backdrop, in the field of car air-conditioning compressors to be mounted in internal-combustion vehicles, we are concentrating on development of a variable-displacement type compressor with considerably greater fuel efficiency while also focusing on an optimum



6SES14 compressor (variable-displacement type)

balance between performance and prices of fixeddisplacement type products targeting emerging countries.

In the field of variable-displacement type compressors, we developed the SES series that simultaneously offers greater fuel efficiency and a reduction in weight, and it has been adopted by TMC in its Corolla, as well as by Daimler AG, General Motors Company (GM), Volkswagen AG and Hvundai Motor Company.

As for fixed-displacement type scroll compressors for light and compact vehicles, we developed the SCSE series, which possesses such excellent properties as lighter weight, greater fuel efficiency and quieter operation. It has been installed in an increasing number of vehicle models of Daihatsu Motor Co., Ltd. and GM.

Since initially being installed in the second-generation Prius, our electric compressors for hybrid vehicles (HVs) and electric vehicles (EVs) have been mounted in all of TMC's HVs from the fourth-generation Prius to the LS600h.

To offer attractive products to the growing number of automakers worldwide now actively engaged in the development of HVs, we developed the ESB series, which is even more compact, fuel efficient and lighter weight. The ESB20 compressor mounted in the new Prius uses a newly developed motor and inverter and has an improved compression structure. We have succeeded in reducing its size and weight compared with the ES14 installed in the third-generation Prius models, while improving its airconditioning capability by 30% and reducing power consumption by 8%.

Besides TMC, Ford Motor Company, Volkswagen, Honda Motor Co., Ltd. and Nissan Motor Co., Ltd., which are already using our electric compressors in their respective HVs and EVs, we will continue to ramp up our efforts to expand sales to other automakers in Japan, the United States and Europe.

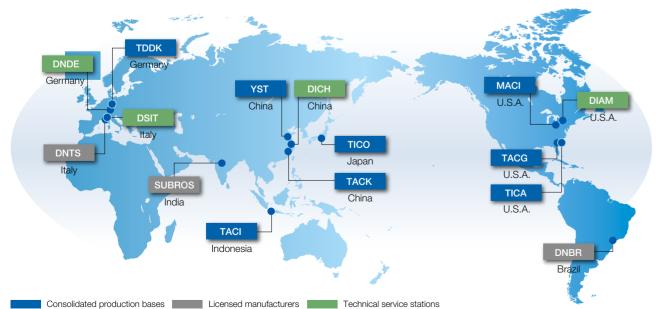


SCSE06 compressor (fixed-displacement scroll type)



ESB20 compressor (electric type)

#### ■ Worldwide Bases of Car Air-Conditioning Compressors (As of March 31, 2016)



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

#### **Augmenting Technical Support Capabilities**

We station our sales engineers in the United States. Germany, Italy and China and provide technical support locally, promoting sales expansion and activities to prevent quality issues from occurring.

In fiscal 2014, two of our consolidated subsidiaries, namely, Michigan Automotive Compressor, Inc. (MACI) in the United States and TD Deutsche Klimakompressor GmbH (TDDK) in Germany, began to conduct design operations

locally. A reduction in development lead time resulting from our local design operations has been received favorably by automakers. We plan to continue this initiative in the future.



Local design operations at MACI

#### **Establishing Optimum Global Production and Supply Structures**

To respond to growing demand for variable-displacement type compressors triggered by the enforcement of more stringent fuel efficiency standards, we are proceeding with augmentation of corresponding production capacities and commenced local production of key functional parts at our production bases in North America.

In Europe, the ASEAN countries and China as well, we are expanding production capacities and increasing the ratio of locally procured parts to accommodate growing demand for car air-conditioning compressors.

#### TOPIC

MACI is Toyota Industries' oldest compressor manufacturing base outside Japan and celebrated its 25th anniversary in June 2015. Globalization of our Car Air-Conditioning Compressor Business, for which we now boast the world's top share\*, began from here. Currently, MACI operates the largest compressor plant in the United States with annual production of more than 5 million units of mainly variable-displacement type compressors, which possess such attributes as high efficiency, greater

fuel economy and low environmental impact. Cumulative production reached 100 million units in December 2015.



#### \* Survey by Toyota Industries Corporation

#### **Car Electronics**

#### **Business Overview in Fiscal 2016**

Net sales of electronics products were affected by a model change of TMC's Prius. Along with the growing market of electric-powered vehicles, we proceeded with efforts to enhance the appeal of our products.

#### **Expanding Experience and Role in Electric-Powered Vehicle Field**

Toyota Industries develops and produces electronic components and devices for electric-powered vehicles, including HVs, plug-in hybrid vehicles (PHVs), EVs and fuel cell vehicles (FCVs). In addition to TMC, we are pursuing business expansion to other automakers in and outside Japan.

#### **Auxiliary Power Source Devices**

A DC-DC converter converts the high voltage of HV batteries to a lower voltage level to supply power to electronic control units. lights, wipers and other auxiliary

For the new, fourth-generation Prius, by developing the world's first thick copper substrate with excellent heat dissipation property and revising the way to integrate components on the circuit board, we reduced the volume and weight of the converter by 50% and 60%, respectively, compared with the product used on the third-generation Prius.

Leveraging our technologies accumulated in the field of DC-DC converters for HVs. we successfully developed and commenced sales of a DC-DC converter for use with start-stop systems, which can



DC-DC converter mounted in the new Prius

suppress a voltage drop at the time of engine restart, and have been promoting its sales to automakers.

A DC-AC inverter is equipped to use home electric appliances in a vehicle and has drawn a great deal of public recognition for its use as an emergency power source following the Great East Japan Earthquake. Since

commencing production in 1995, we have achieved cumulative production of 18 million units in March 2016.

We have developed an on-board charger based on our



DC-AC inverter mounted in the new Prius

technologies and cultivated know-how regarding EV chargers developed since the 1990s. The resulting on-board charger is mounted in the Prius Plug-in Hybrid.

In addition, we develop and produce inverters for electric car air-conditioning compressors for HVs and other electric-powered vehicles. These inverters have been contributing to increasing the product appeal of our car air-conditioning compressors. (See Special Feature 2 on pages 26–29 for details.)

We have also leveraged our inverter technologies related to electric car air-conditioning compressors and successfully developed a highly efficient, low-cost inverter for hydrogen circulation pumps. The new inverter has been adopted in TMC's MIRAL FCV.

#### **Core Components for Drive Systems**

Since 1967, we have been providing inverters for materials handling equipment and accumulating a pool of know-how and expertise on power electronics technologies.

Utilizing such technologies,
Toyota Industries applied its proprietary direct-cooling method to develop a device with significantly higher cooling performance in 2009. We have entered the field of



4WD rear inverter mounted in the new Prius

core components for drive systems such as power control units (PCUs) for the third-generation Prius.

The new Prius offers a four-wheel drive (4WD) model for the first time in the series, and it is fitted with our rear inverter for 4WD use. This product converts the DC voltage of HV batteries to AC voltage and feeds power to the 4WD rear motor. The adoption of a forced air-cooling system eliminates the need to install cooling water piping, thereby providing greater ease in mounting the inverter on vehicles. The inverter also features quieter operation as it is mounted near the cargo space.

In the future, we will augment our development efforts in

order to increase orders for core components of drive systems, for which further growth is expected.

#### **Charging Infrastructure**

Toyota Industries sells public-use charging stands and home-use charging units for PHVs and EVs, which have been jointly developed with Nitto Kogyo Corporation.

We exhibited our new public-use charging stand at the 44th Tokyo Motor Show held in October 2015. This product consists of one main control stand that offers charging functionality as well as such features as communication, IC card-based user authentication and billing, and multiple low-cost, charging-only sub-stands. Besides the existing model's features, the main control stand has an additional capability to control up to 10 sub-stands, thereby reducing the initial costs of installing multiple charging stands.

We are positioning this new charging stand as a standard model of the charging infrastructure and will strive to enhance its functionality to ensure that we continue to satisfy customer needs. Along with sales of charging stands, we will work to enhance maintenance, inspection and other services.



Charging stand for PHVs and EVs

### Accelerating Development Activities to Contribute to a Low-Carbon Society

As many countries adopt regulations requiring high energy efficiency, electrification is expected to become more widespread not only for automobiles but also for materials handling equipment and other non-automotive products. Targeting the high-growth, electric-powered vehicle market, we will accelerate our development efforts to enhance our products in the fields of HVs, PHVs, EVs and FCVs, thereby contributing to a low-carbon society.

### **Textile Machinery**



Based 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\*1 in unit sales, to ring spinning frames and roving frames.

\*1: Survey by Toyota Industries Corporation

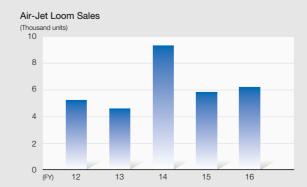
#### **Business Overview in Fiscal 2016**

The textile machinery market remained stagnant as economic growth slowed down in China and emerging countries in Asia. While sales of weaving machinery expanded, with unit sales of air-jet looms increasing 400 units, or 8% year-on-year, to 6,200 units, sales of spinning machinery and yarn quality measurement instruments declined. As a result, net sales were down ¥2.5 billion, or 4%, from the previous fiscal year to ¥65.6 billion.

# **Business Development of Weaving and Spinning Machinery**

In the field of weaving machinery, we introduced an enhanced electronic shedding device to our JAT810 air-jet loom, for which we enjoy the world's top market share. This shedding device serves to increase textile variations by enabling the weaving of fabrics with complex patterns.

In the field of spinning machinery, we have added a feature to the RX300 high-speed ring spinning frame as an option to produce a new spun yarn called mosaic yarn\*2



and have been receiving favorable feedback from many customers.

We aim to meet customer expectations by developing textile machinery that produces high value-added textile products through the pursuit of advanced technologies and continuous creativity and ingenuity as well as by providing meticulous after-sales services via an enhanced service structure.

#### **Participation in ITMA 2015**

In November 2015, Toyota Industries participated in ITMA 2015, an international textile machinery exhibition held in Milan, Italy. A total of 1,600 companies from 46 countries participated in the event, including those in Europe, India and China, and there were more than 120,000 visitors. At this exhibition, we displayed our JAT810 air-jet loom, RX300 high-speed ring spinning frame and various other products and appealed the excellence of these products' environmental performance and reliability. As for the TCO12 comber co-developed with Truetzschler GmbH & Co. KG, our partner manufacturer of spinning machinery in Germany, we conducted a demonstration of its automatic lap\*3 change system called Automatic Lap Piecer. The system's excellent stability during high-speed operation received high marks from visitors.

Uster Technologies AG, a Swiss-based consolidated subsidiary producing yarn quality measurement instruments, also participated in the exhibition to present, among others, the world's first quality control system covering the entire spinning process and appealed its advanced total quality solutions.



Spinning machinery booth





Weaving machinery booth

Uster Technologies booth

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- \*2: A special yarn newly developed by Toyota Industries, which is made by alternating or mixing two rovings in different colors, offering a considerable degree of freedom in color and design choices
- \*3: A roll of thinly spread sheet of fibers