

# TRUCKS

## Overall Trends

### 1 Introduction

In 2018, the socioeconomic situation outside Japan was marked by the meeting between U.S. President Trump and North Korean Supreme Leader Kim (in June), which reduced tension over the issue of nuclear weapons, and the arising of trade friction over intellectual property between the U.S. and China (starting in March), which raised concerns over how the Chinese economy would be affected. The Japanese economy continued its gradual recovery, and could match its largest post-war growth. Corporate profits reached record highs, but the declining birthrate and aging of the population and the decrease of the working age population are making the labor shortage keenly felt. The Japanese government is making efforts to promote sustainable growth by establishing work reform legislation and revising the Immigration Control and Refugee Recognition Act to accept more foreign workers. In the automotive field, models were restyled to comply with the 2016 emissions regulations and add safety systems. More autonomous driving technologies have been introduced in commercial vehicles as part of safety measures to address the growing social issue of elderly drivers.

### 2 Recent Truck Market Trends

#### 2.1. Freight Shipments in Japan

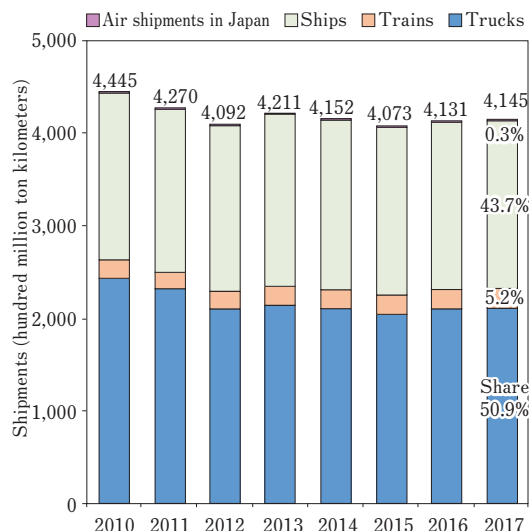
Freight shipments in Japan in 2017 amounted to 414.5 billion ton kilometers, a 0.3% increase compared to 2016. Of those, 210.8 billion ton kilometers were shipped by truck and 21.7 billion ton kilometers was shipped by sea. In terms of share, motor vehicles accounted for 50.9%, sea shipping for 43.7%, trains for 5.2%, and air shipping for 0.3% (Fig. 1).

When the amount of freight shipped by motor vehicles is further broken down by truck type, ordinary trucks account for 80.3% of the total, light-duty trucks for 1.7%, special-purpose trucks for 17.7%, and mini-vehicle trucks

for 0.2%. Compared to the previous year, the number of ordinary trucks increased by 0.4%, while the number of special purpose trucks decreased by 0.4% (Fig. 2).

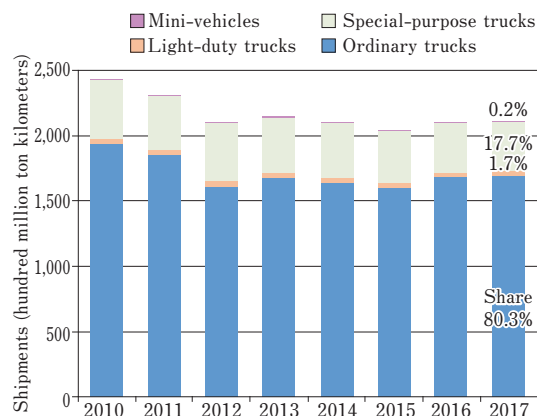
#### 2.2. Number of Trucks in Japan

The number of trucks owned in Japan continues to decrease. At the end of 2018, the number of trucks was approximately 14.3 million vehicles, a decrease of approxi-



Private mini-vehicle trucks have been excluded from the survey since 2010.

Fig. 1 Freight Shipments in Japan (Fiscal Year)



Private mini-vehicle trucks have been excluded from the survey since 2010.

Fig. 2 Freight Shipments in Japan by Vehicle Type (Fiscal Year)

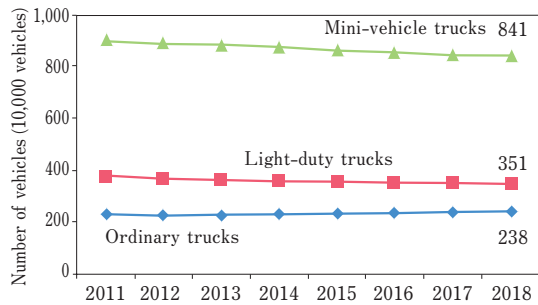


Fig. 3 Number of trucks in Japan According to Vehicle Type (as of the End of December)

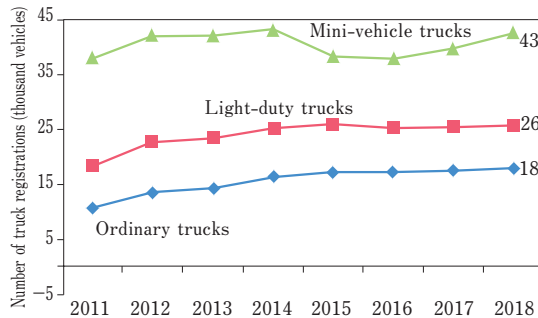


Fig. 4 Number of Truck Registrations in Japan According to Truck Type

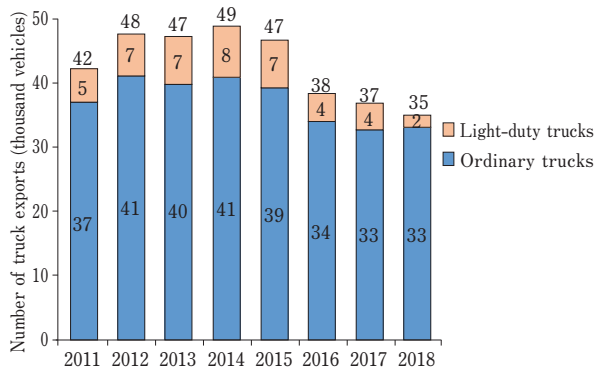


Fig. 5 Number of Truck Exports According to Truck Type

mately 20,000 vehicles or 0.1% compared to the previous year for light-duty and mini-vehicle trucks (Fig. 3).

### 2.3. Number of Truck Registrations in Japan

The number of truck registrations in Japan in 2018 was approximately 870,000, an increase of 4.0%, or 35,000 vehicles, compared to the previous year. By truck type, the number of ordinary trucks grew by 2.0%, that of light-duty trucks increased by 1.0%, and the number of mini-vehicle trucks rose by 7.0% compared to the previous year (Fig. 4).

### 2.4. Truck Exports

Approximately 350,000 trucks were exported in 2018, a decrease of 18,000 units, or 5.0%, compared to the previous year. By type of truck, the number ordinary trucks

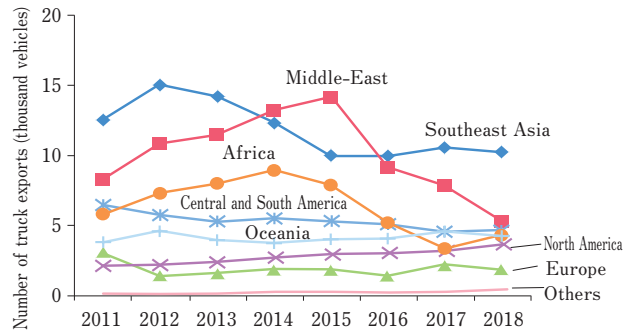


Fig. 6 Number of Truck Exports According to Destination

increased by 5,000 vehicles, and that of light-duty trucks decreased by 23,000 vehicles.

By destination, exports to North America and Africa rose, while exports to Southeast Asia, Europe, the Middle-East, Central and South America, and Oceania decreased. Exports to Africa, which had been declining since 2015, exhibited a considerable increase of 28.5% over the previous year (Fig. 6).

## 3 2018 Model Year Trucks and Special Characteristics

### 3.1. Trucks Manufactured in Japan

In 2018, trucks exceeding 7.5 tons were restyled to comply with the 2016 emissions regulations and add safety systems.

#### 3.1.1. Heavy-Duty Trucks

Isuzu brought out the Giga Tractor (Fig. 7) which exceeds the 2015 fuel economy standards by 5% in addition to complying with the 2016 emissions regulations (June).

As with the new Profia launched in 2017, the Profia Tractor (Fig. 8) released by Hino features a revamped exterior and interior, complies with the 2016 emissions regulations, and is equipped with safety systems (July). The collision mitigation braking system has been upgraded to detect stopped vehicles and pedestrians and help avoid collisions.

#### 3.1.2. Medium-Duty Trucks

Mitsubishi Fuso Truck and Bus released a Fighter (Fig. 9) compliant with the 2016 emissions regulations that also exceeds the 2015 fuel economy standards by 5% and is fitted with a 4-cylinder turbocharged engine (August). Weight has been reduced by 300 kg compared to the previous model with a 6-cylinder turbocharged engine, and the vehicle offers the highest carrying capacity in its gross vehicle weight class.



Fig. 7 Isuzu Giga Tractor



Fig. 11 Mitsubishi Fuso Truck and Bus Canter



Fig. 8 Hino Profia Tractor



Fig. 12 Suzuki Super Carry



Fig. 9 Mitsubishi Fuso Truck and Bus Fighter



Fig. 13 Daihatsu Hijet Truck



Fig. 10 Isuzu Elf



Fig. 14 Mitsubishi Minicab Truck

### 3. 1. 3. Light-Duty Trucks

The Isuzu Elf (Fig. 10), which has a gross vehicle weight that exceeds 7.5 tons, was made compliant with the 2016 emissions regulations and released with a high horsepower engine (May). A version with specifications that include pre-collision braking and other safety systems, as well as the first communication terminal with connectivity functions in its class, as standard equipment was also made available (October).

Mitsubishi Fuso Truck and Bus released an upgraded Canter (Fig. 11) that makes collision mitigation braking and vehicle stability control systems, which will become mandatory for its class, standard equipment (September).

### 3. 1. 4. Mini-Vehicle Trucks

Suzuki expanded the cabin of the Carry toward the

rear and adopted a high roof, ensuring ample interior space and made front and rear false start prevention functions standard equipment to release the Super Carry (Fig. 12) (May).

Daihatsu added a Hijet Truck (Fig. 13) equipped with a collision avoidance support function to its lineup (May).

Mitsubishi released a Minicab Truck (Fig. 14) featuring front and rear false start prevention function as standard equipment (June).

## 3. 2. Trucks Manufactured outside Japan

Following the first complete restyling in 21 years, Scania introduced its Next Generation series (Fig. 15), made compliant with the 2016 emissions regulations in the Japanese market (April: tractor, September: rigid truck).



Fig. 15 Scania Next Generation

Volvo Trucks released an FH (Fig. 16) semi-truck model compliant with the 2016 emissions regulations (November).

#### References

- (1) Ministry of Land, Infrastructure, Transport and Tourism, Specified Statistics Related to Traffic, <http://www.mlit.go.jp/ktoukei/> (in Japanese)



Fig. 16 Volvo Trucks Volvo FH

- (2) Japan Automobile Manufacturers Association Monthly Report on Motor Vehicle Statistics, [http://www.jama.or.jp/stats/m\\_report/](http://www.jama.or.jp/stats/m_report/) (in Japanese)
- (3) Japan Automobile Manufacturers Association database, <http://jamaserv.jama.or.jp/newdb/index.html> (in Japanese)
- (4) Manufacturer public relations materials and product catalogs

## ❖❖❖❖❖❖❖❖❖❖ Design Trends ❖❖❖❖❖❖❖❖❖❖

### 1 Trends in Japanese Truck Design

Since the four major Japanese manufacturers had already completed their redesigns by 2017, no notable activity took place in 2018. Lately, interior and interior design changes are often made as part of efforts to raise product appeal when compliance with new environmental or safety regulations becomes necessary, and manufacturers presumably followed the same schedule in introducing new models.

### 2 Trends in Truck Design outside Japan

Between 2012 and 2016, major European manufacturers, including Mercedes-Benz, Volvo, DAF, Renault and Scania restyled the interiors and exteriors of their heavy-duty trucks. Since then, as in Japan, neither heavy- nor medium-duty trucks have been the object of major redesigns, with manufacturers have limiting themselves to making minor modifications to components.

In that context, MirrorCam, which could significantly impact truck design, has been installed on the Mercedes-Benz Actros (Fig. 1), the first heavy-duty production truck to be equipped with that system. Compared to the current model, changes in the exterior design are limited

to a new headlamp design. The cameras themselves are placed in the same position as the traditional rearview mirrors and can be replaced with the normal mirrors sold concurrently. As shown in Fig. 2, the images from the cameras are presented on the large displays set on the inside of the left and right pillars. Changes to the interior design centered on the area around the driver's seat. The instrument cluster uses the same arrangement of two thin LED color displays as in the manufacturer's passenger cars, and the periphery has been made slightly less box-like.

In the van category, Mercedes-Benz also restyled the Sprinter (Fig. 3), which distinguishes itself with precise, flowing and substantial expression that echoes the Vision Van concept presented at the 2016 International Motor



Fig. 1 Exterior of Mercedes-Benz Actros



Fig. 2 Interior of Mercedes-Benz Actros



Fig. 3 Exterior of Mercedes-Benz Sprinter



Fig. 4 Interior of Mercedes-Benz Sprinter

Show Germany (IAA). The sharp character lines of the previous model have been eliminated, and the use of smooth panels gives both a sense of quality and solidity. The quality of mating between components has also been enhanced, giving as sense of the relationship with newer Mercedes-Benz passenger cars. The interior features a thin panel with a monitor in its center combined with a simple dashboard with a flowing shape (Fig. 4). As in the manufacturer's passenger cars, the design of the switches, steering wheel, and air vents is finely detailed, enhancing the sense of quality while contributing to building the family image.

Little known in Japan, the Turkish BMC and Ford Otosan brands announced new heavy-duty truck models.

The BMC Tugra distinguishes itself with its clean and modern feel achieved by a simple and vivid graphics, a



Fig. 5 BMC Tugra



Fig. 6 Ford F-Max

straight line theme, and a streamlined surface. The incorporation of details such as a surface treatment ranging from the top of the corner panel to the door and aerodynamic devices integrated in the corner panels ensure that even as a single block, the vehicle does not just look like a box. It is also noteworthy for the vivid distinctions in coating between the silver-painted front grille, body color and bumper and creative forms near areas between components, which eliminate the cheap impression caused by poor part mating quality that tends to be seen in relatively inexpensive trucks.

The other truck is the F-Max (Fig. 6) announced by Ford Otosan, a joint venture between Ford and the Koç Holding, a local manufacturer. The rough and powerful design it shares with Ford pickup trucks for the North American market draws the eye. Combining a simple design motif and surface configuration with details encompassing headlamps and a front grille that give a sophisticated impression give its appearance a sturdy presence and sense of quality that rivals trucks from European manufacturers such as DAF and Iveco. It also avoids relying on ornamentation, and is notable in using a well-balanced alternation of glossy and matte black on components to enhance appearance quality while keeping cost down.



Fig. 7 Freightliner eCascadia and eM2



Fig. 8 Exterior of MAN CitE

In North America, Freightliner announced the eCascadia and eM2 (Fig. 7). The front grille presents an exclusive design that, unlike in internal combustion engine specifications, closes the cooling vents and combines a glossy black panel with illumination set along both edges. The overall design motif matches that of the manufacturer's other trucks. Other than the front grille, there are no exclusive components reflecting the difference in the power source. The eActros announced by Mercedes-Benz, another member of the Daimler Trucks group also limits the difference in external appearance to the emblem alone, keeping promotion the truck as an electric vehicle subdued.



Fig. 9 Interior of MAN CitE

### 3 Design of Concept Vehicles

As in past years, several manufacturers exhibited concept vehicles at the 2018 IAA, each of which garnered attention.

The CitE (Fig. 8) medium-duty truck concept announced by MAN features a low-floor package that, in Europe, is primarily used in garbage trucks. The design evokes nimbleness with a black and white concept, and elements such as the interior making use of wood grain, colors with vivid accents, and the use of camera mirrors follow in the footsteps of reasonably established expressions for electric vehicles (Fig. 9) The direction of the exterior design comes closer to the manufacturer's new bus designs than to that of its existing truck lineup. The use of the same headlamps as the aforementioned new buses and a dashboard size comparable to that of current models, notably, ground the packaging and components in reality relative to the near-future appearance of the vehicle, presenting the question of whether it is simply a styling concept or a design study for the next-generation model.



Fig. 10 Volvo Trucks Vera

Volvo Trucks announced the Vera autonomous heavy-

duty truck concept (Fig. 10). In contrast to the clean, but powerful design of the current truck lineup, this concept vehicle is contained in a relatively flowing surface configuration. The Volvo image can be gleaned from the headlight motif and distinctive design of the wheels, while the brand expression using a vehicle without a cabin may represent an upcoming issue for manufacturers.

Mercedes-Benz announced the Vision Urbanetic light duty commercial vehicle concept designed for urban environments. Equipped with fully autonomous navigation technology, it takes the approach of swapping a people mover cabin module (Fig. 11) and cargo module (Fig. 12) based on usage. The cabin module uses organic graphics to present an image reminiscent of modern architecture,



**Table 3 Main Product Technology Trends for Light-Duty Trucks In 2018**

Month of launch	Name of vehicle model	Main characteristics
March	Elf (exceeding 7.5 t) (Isuzu Motors)	Partial restyling Compliance with 2016 emissions regulations
May	Elf (exceeding 7.5 t) (Isuzu Motors)	Partial restyling High horsepower specification added
September	Canter (Mitsubishi Fuso)	Partial restyling Safety systems added
October	Elf (Isuzu Motors)	Partial restyling Safety systems added

made compliant with the 2016 emissions regulations and features a high horsepower engine. In October 2018, a version with specifications that include pre-collision braking and other safety systems, as well as a communication terminal with connectivity functions as standard equipment was made available. Mitsubishi Fuso Truck and Bus announced an upgraded Canter with specifications that make collision mitigation braking and vehicle stability control systems, which will become mandatory for its class, standard equipment

#### 1. 1. 4. Mini-Vehicle Trucks

Table 4 shows the large trucks announced in Japan in 2018, and the main product technology trends. Suzuki added the Super Carry, a Carry with its cabin expanded toward the rear that adopts a high roof to ensure ample interior space, to its lineup. It also has front and rear false start prevention function as standard equipment. Daihatsu added specifications that include a collision-avoidance assist system and LED fog lamps, yet another example highlighting manufacturer efforts to offer a comprehensive set of safety systems. Honda released the Spirit Color Style special specifications model of the Acty.

#### 1. 1. 5. Trucks Manufactured outside Japan

Scania has brought each of the series it completely restyled in 2018 to the Japanese market. In addition to the previous R-series, the top grade S-series is also available, and features revamped cabin in interiors and exteriors, as well as new powertrains. Whole-vehicle specifications also became available in September 2018. Volvo used a partial restyling to comply with the 2016 emissions regulations and applied substantial advances to the powertrain.

In May 2018, the Italian Iveco unveiled the Stralis NP 400 heavy-duty truck that uses liquid natural gas (LNG) and compressed natural gas (CNG) as fuel.

At an exhibition of commercial vehicles held in Han-

**Table 4 Main Product Technology Trends for Mini-Vehicle Trucks In 2018**

Month of launch	Name of vehicle model	Main characteristics
May	Hijet Truck series Hijet (Daihatsu) Sambar Truck (Subaru) Pixis Truck (Toyota)	Safety systems added
	Carry series Carry (Suzuki) NT100 Clipper (Nissan) Minicab Truck (Mitsubishi) Scrum Truck (Mazda)	Safety systems added Long cabin specification added (Suzuki)
November	Acty (Honda)	Special color specification added

nover, Germany, in September 2018, manufacturers presented their latest autonomous driving technologies and safety systems. Daimler Trucks unveiled the Actros and eActros EV truck as the first production heavy-duty trucks in the world equipped with level 2 automated driving. Mitsubishi Fuso Truck and Bus exhibited the eCanter production light-duty EV truck.

#### 1. 2. Interior Comfort

Cabins in Japanese trucks are expected to offer improved comfort and functionality within the dimension limits imposed by regulations. In heavy-duty vehicles, notably, manufacturers are relying on high-roof specifications to facilitate getting changed and moving around in the cabin. In short cabin-specification models that prioritize loading space, they are seeking to enhance comfort in a limited space by providing head room in the roof area. Greater storage capacity and, more recently, the installation of USB ports are example of measures to enhance user convenience.

#### 1. 3. Operability

In the truck transportation sector, a pillar of everyday life, the number of drivers is decreasing year after year, and safety, operability (maneuverability) and ease of cargo handling must be taken into account in vehicles to retain current drivers and attract new ones, particularly in the case of women drivers. Manufacturers are securing visibility, placing mirror, and providing seat position adjustment functions designed to accommodate people of all heights and builds, and often place switches in the steering wheel to minimize the required eye movement. In addition, more vehicles are switching to automatic



transmissions, and multi-information displays are increasingly common.

#### 1.4. Noise and Vibration

To ensure interior comfort, manufacturers are relying on the optimal placement of sound absorbing and acoustic material in the cabin to reduce noise, and are also applying sound absorbing material such as glass wool or felt to cover plates such as plastic parts around the engine. As the transition to EVs progresses, manufacturers are also taking measures to reduce road noise and sound from the air conditioner, which were previously masked by the sound of the engine.

#### 1.5. Safety

Higher performance is being called for in both passive and active safety. With advanced emergency braking systems (AEBS), electronic stability control systems (ESC) and lane departure warning systems (LDWS), becoming mandatory, manufacturers are installing collision avoidance support and collision mitigation braking systems in their light-, medium- and heavy-duty trucks. Driving support systems are also becoming more widespread. Manufacturers are also increasingly equipping their mini-vehicle trucks with false start prevention functions as well as collision avoidance support and collision mitigation braking systems. The Mitsubishi Fuso Truck and Bus Super Great is equipped with Active Sideguard Assist to prevent accidents when making left turns, which rank third among causes of traffic accidents. Manufacturers now use LEDs in the exterior lamps, which improves nighttime visibility. The use of online connected services that proactively prevent failures through remote diagnostics or centrally manage vehicle information that tie in to accidents is also becoming more common among manufacturers.

The UD Trucks Quon unveiled level 4 autonomous driving ahead of the competition in 2018, announcing a demonstration to pave the way for fully autonomous driving.

#### 1.6. Aerodynamic Characteristics

Aerodynamic characteristics have the potential to improve fuel efficiency more economically and efficiently than engine or other improvements, while accessories

such as mudguards effectively mitigate dirt accumulation on the vehicle body, making this an area manufacturers actively strive to improve. Some manufacturers, for example, adjust the airflow at the top of the cabin and at the top of the cargo box using an optimized shape provided by a customization variation that makes it possible to minimize the height difference between the roof spoiler and cargo box. Manufacturers are also enhancing aerodynamic characteristics by optimizing the front surface of the vehicle and improving the airflow along its side and bottom surfaces.

As more and more trucks become hybrid or electric vehicles, aerodynamic characteristics will play a major role with respect to not only fuel efficiency, but also quietness.

#### 1.7. Corrosion Prevention

With the adoption of more elegant designs by manufacturers, shapes are also becoming more complex, and parts, particular in the front of the vehicle, are increasingly made from plastic rather than sheet metal. The adoption of many plastic parts also constitutes a measure against corrosion caused by flying rocks. In the chassis, applying a shot blasting surface treatment and thorough use of electrodeposition also improves corrosion resistance.

## 2 Rear Body

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The severe shortage of drivers has become a problem in the truck transportation sector. To improve transport efficiency, double articulated trucks, which consist of one heavy-duty truck pulling two trailers of freight content, are being introduced and are contributing to labor saving. Field tests have been carried out since October 2016, and the limit on the vehicle length for full trailer double articulated trucks has been raised from the current 21 meters to 25 meters. This has mainly been implemented in sections of the Shin-Tomei expressway since January 29, 2019.

#### References

- (1) Manufacturer public relations materials and product catalogs