

SPECIAL PURPOSE VEHICLES

1 Introduction

According to data compiled by the Japan Automobile Dealers Association (JADA), the number of heavy- and medium-duty truck registrations in 2016 increased to 94,188 units, 105.4% of the level in 2015 and the seventh successive year-on-year increase since registrations bottomed out in 2009. Possible reasons for this increase include rising demand for logistics and construction trucks as the economy recovers, such as for recovery work after the Great East Japan Earthquake and projects related to the 2020 Tokyo Summer Olympics. In contrast, registrations of light-duty trucks in 2016 fell slightly to 254,560 units, 97.9% of the level in 2015.

Furthermore, although overall production of special purpose vehicles increased in 2016, it only reached 100.8% of the level in 2015, which is less than the 105.4% figure for heavy- and medium-duty truck registrations in the same period. Production of these vehicles seems to have reached a plateau after recent higher rates of increase.

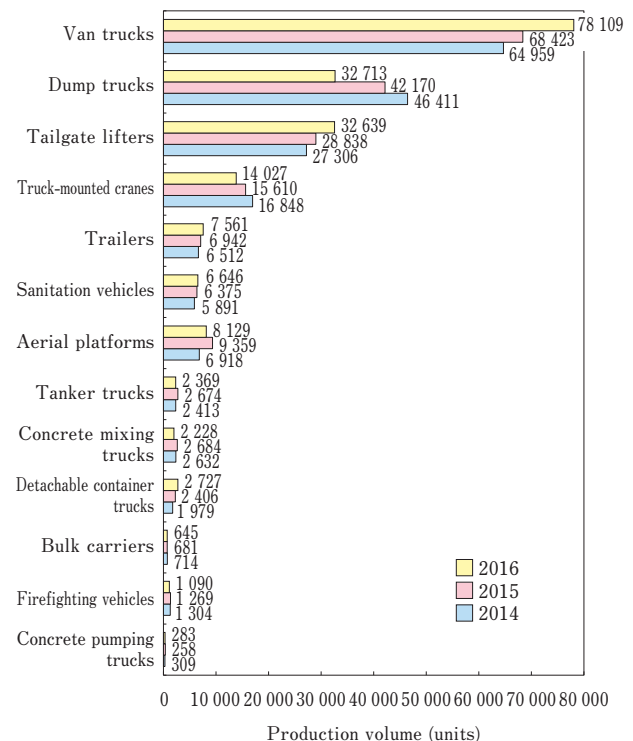
This article describes the main special purpose vehicle trends based on data compiled by the Japan Auto-Body Industries Association (JABIA), the Japan Construction Equipment Manufacturers Association (CEMA), and the Automobile Inspection and Registration Information Association (AIRIA).

2 Market Trends

In 2016, total production of the thirteen types of special purpose vehicles shown in Fig. 1 increased, albeit slightly, by 1,474 units to 189,166 (100.8% of 2015). This was the seventh consecutive year-on-year increase after the low point in 2009. Different categories of these vehicles saw different results. For example, although the production of dump trucks, concrete mixing trucks, and fire fighting vehicles fell by around 20% from 2015, this was offset by the production of vans, detachable container

trucks, and tailgate lifters, which increased by at least 10%.

Figure 1 shows the 2016 production results of special purpose vehicles per vehicle type. Compared to 2015, van production increased by 9,686 units to 78,109 (114.2%). However, dump truck production fell substantially by 9,457 units to 32,713 (77.6%). Within the dump truck category, large falls were recorded in both medium-duty (79.2%) and heavy-duty (62.8%) dump truck production. The production of six types of special purpose vehicles increased compared with 2015. The largest percentage-based production increase was achieved by vans (114.2%), followed by detachable container trucks, which rose by 321 units to 2,727 (113.3%), and tailgate lifters, which rose by 3,798 units to 32,639 (113.2%). The production of concrete pumping trucks, trailers, and sanitation vehicles



Source: JABIA

Fig. 1 Production results of special purpose vehicles per product type.

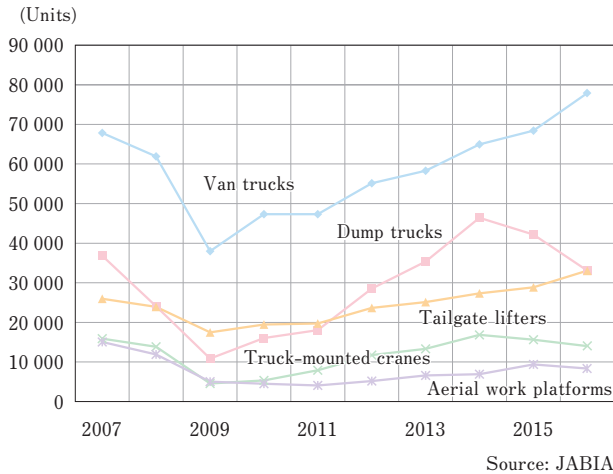


Fig. 2 Production trends of five typical special purpose vehicle types.

also increased. In contrast, the production of seven types of special purpose vehicles decreased, including dump trucks, which fell by 9,457 units to 32,713 (77.6%), concrete mixing trucks, which fell by 456 units to 2,228 (83.0%), fire fighting vehicles, which fell by 179 units to 1,090 (85.9%), and aerial platforms, which fell by 1,230 units to 8,129 (86.9%).

Figure 2 shows the production trends for five typical products (vans, dump trucks, tailgate lifters, truck-mounted cranes, and aerial platforms) with annual production in 2016 of more than 10,000 units over the past ten years. Van trucks production has increased every year since hitting bottom in 2009, with production in 2016 reaching 205.6% of the level in 2009. Similarly, tailgate lifter production in 2016 reached 186.7% of the level of production in 2009. Production of both of these vehicle categories has increased for seven consecutive years. However, dump truck production has continued to fall after reaching a peak in 2014. Including the state of concrete mixing truck production described above, the drop in construction vehicle production is starting to become a noticeable trend.

Figure 3 shows the trends for the average number of years in service from initial registration. Although the service age of each of these seven vehicle types has been increasing since 2004, the service age of light-duty dump trucks has fallen since 2014, from 13.35 years in 2013 to 13.17 in 2015, and 13.07 in 2016. This trend is also reflected in the service age of medium & heavy-duty dump trucks, which has also decreased for three consecutive years since 2014, from 13.08 years in 2013 to 12.62 in 2015, and 12.44 in 2016. This is probably because the in-

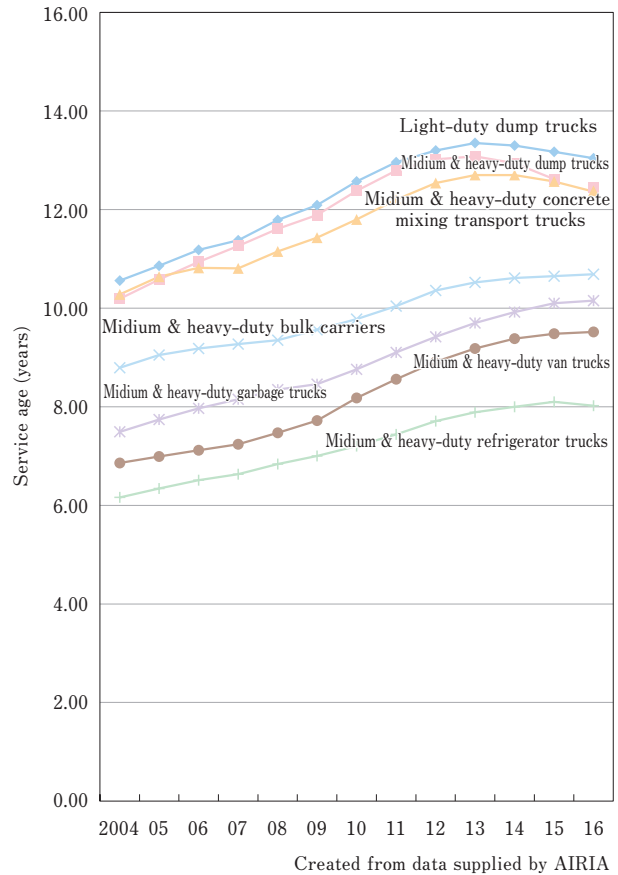


Fig. 3 Average service age from initial registration.

crease in dump truck production over the last few years has increased the proportion of dump trucks with shorter service lives, while reducing the high proportion of dump trucks with longer service lives registered before the global financial crisis. Although it is likely that the fall in the service age of dump trucks is not likely to continue for much longer and will probably start to increase again, it is hoped that the service age of this category will remain between 12 and 13 years.

The service age of construction vehicles including concrete mixing trucks remains around two years longer than other logistics-related vehicles, which is affected by the distances driven and lengths of time that these vehicles are in operation, and it is likely that this clearly separated dual trend will continue in the future.

This graph was prepared from registration data provided by AIRIA. The original registration data includes the number of registered vehicles at the end of March 2016 for each registration year between 1997 and 2016, and as collected data prior to 1996 (i.e., vehicles in service for more than 20 years). The average service age was extrapolated from these figures.

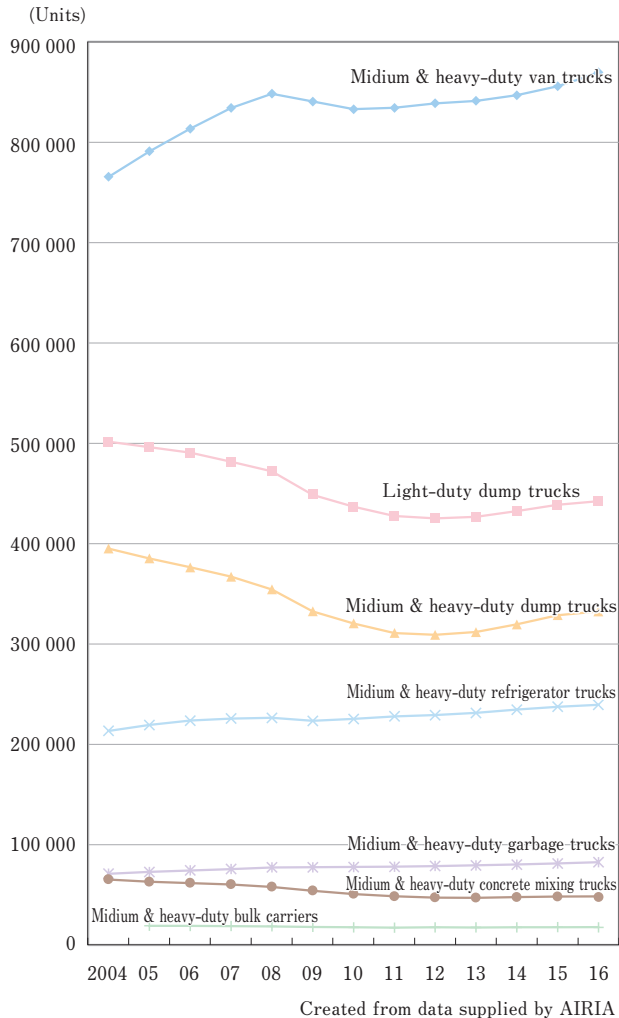


Fig. 4 Overall number of special purpose vehicles in Japan.

Figure 4 shows the overall number of each of these vehicle types in Japan at the end of March each year. Although the number of standard vans increased up to 2008, it has hardly increased since then. The number bottomed out at 832,809 due to the effects of the global financial crisis and has since increased slightly to 869,278 in 2016. Pulling out of a continuous steady decline, the numbers of both light-duty and midium & heavy-duty dump trucks have increased between 2012 and 2016. The numbers of midium & heavy-duty refrigerator trucks and midium & heavy-duty garbage trucks have increased each year since 2004, reaching 112.2% and 116.3% of the number in 2004, respectively. The numbers of construction vehicles such as dump trucks and concrete mixing trucks decreased sharply up to 2011. The increase in these vehicles after bottoming out in 2012 and 2013 may be attributed to greater demand for special purpose construction vehicles for projects related to

Table 1 Production proportion of non-earth and sand dump trucks, and dump trucks with SUS or aluminum bodies.

Vehicle model	Non-earth and sand	SUS	Aluminum
2-ton trucks	1.7%	0.7%	0.0%
4-ton trucks (GVW: less than 8 tons)	9.0%	2.0%	0.0%
GVW: more than 8 tons (6 to 8 tons)	16.9%	4.5%	0.0%
GVW: 20 tons	16.3%	7.7%	0.1%
GVW: 22 tons	42.5%	26.3%	1.9%
GVW: 25 tons	87.8%	43.1%	7.2%

Source: JABIA

earthquake recovery, the 2020 Tokyo Summer Olympics, and the like.

3 Special Purpose Construction Vehicles

3.1. Dump trucks

Dump truck production in 2016 decreased to 32,713 units (77.6% of 2015). According to vehicle class, heavy-duty dump trucks decreased by 3,363 units to 5,683 (62.8%), medium-duty dump trucks decreased by 3,630 units to 13,814 (79.2%), and light-duty dump trucks decreased by 2,108 units to 12,378 (85.4%). Overall dump truck production started to fall in 2015 after increasing for five consecutive years up to 2014, and the production of all heavy-, medium-, and light-duty dump truck classes fell sharply in 2016. According to each class, the proportion of heavy-duty dump trucks fell from 21.5% to 17.4% between 2015 and 2016, the proportion of medium-duty dump trucks rose from 41.4% to 42.2%, and the proportion of light-duty dump trucks rose from 34.9% to 37.8%. As these figures show, the proportion of heavy-duty dump trucks has fallen.

Table 1 shows the proportions of dump trucks produced in 2016 for transporting material other than gravel or sand (i.e., non-gravel and sand dump trucks). In 2016, the proportion of 4-ton payload vehicles was 9.0%, the proportion of trucks with a gross vehicle weight (GVW) of 20 tons was 16.3%, and the proportion of trucks with a GVW of 22 tons was 42.5%, indicating that the proportion of non-gravel and sand dump trucks is increasing. The increasing proportion of non-gravel and sand dump trucks reflects the decrease in production of all classes of dump trucks for transporting gravel or sand in 2016, as well as the increase in the production of non-gravel and sand dump trucks for carrying away industrial waste, rubble, and the like. In addition, stainless steel (SUS) is used as a long-life corrosion-resistant body material for dump trucks. The proportion of SUS dump trucks rose in accordance with the increase in non-gravel and sand

dump trucks (GVW of 20 tons: 7.7%, GVW of 22 tons: 26.3%, GVW of 25 tons: 43.1%).

Although most of these dump trucks were powered by diesel engines, one hybrid, and seven compressed natural gas (CNG) or liquefied petroleum gas (LPG) powered dump trucks were produced in 2016. However, none were produced in the 4-ton or heavier categories.

3.2. Concrete mixing trucks

Similar to the trend for dump trucks, production of concrete mixing trucks in 2016 fell sharply to 2,228 units (83.0% of 2015). Although the production of concrete mixing trucks increased between the low point of 2010 and 2015, production fell again in 2016. Production trends different according to size. Although the production of heavy-duty concrete mixing trucks fell to 1,472 units (70.3%), medium-duty concrete mixing trucks increased to 502 units (106.6%), and light-duty concrete mixing trucks increased to 254 units (213.4%). Reflecting this trend, the proportion of heavy-duty concrete mixing trucks fell sharply from 75.4% to 66.1% between 2015 and 2016. Although the average service age since initial registration of concrete mixing trucks increased from 10.28 to 12.70 years between 2004 and 2014, it has to fallen for two consecutive years in 2015 and 2016. In addition, although the overall number of concrete mixing trucks in use fell greatly up to 2013, this number has been stable since then.

4 Fixed Capacity Special Purpose Vehicles

4.1. Tanker trucks

Production of tanker trucks in 2016 was 2,369 units (88.6% of 2015). According to class, production of heavy-duty tanker trucks decreased to 466 units (94.0%), medium-duty tanker trucks to 1,640 units (86.2%), and light-duty tanker trucks to 257 units (95.2%). Despite the decrease in production in 2016, this figure is still 200.3% of the number of tanker trucks produced at the low point of 2009 (1,183 units) The proportion of production per size class (heavy-, medium-, and light-duty) remained unchanged from 2017 at 2:7:1.

According to use, the proportion of oil tanker trucks remained high, with production increasing by 51 units to 1,489 (103.5%). However, production of water spraying or water supply trucks fell sharply to 774 units (67.1%).

Consequently, since the amount of water spraying or water supply truck production fell in 2016, the propor-

tion of oil tanker trucks in 2016 rose to 62.9% of the total number of tanker trucks according to use.

4.2. Bulk carriers

Production of bulk carriers in 2016 decreased to 645 units (94.7% of 2015). According to class, heavy-duty bulk carriers accounted for approximately 98.3% of this total, demonstrating the growing prevalence of heavy-duty vehicles in this segment. According to use, production of bulk cement carriers fell by 98 units from 409 in 2015 to 311 in 2016. In contrast, production of bulk feed carriers increased by 44 units from 209 to 253. The proportion of bulk cement carriers to bulk feed carriers and carriers used for other applications leveled out in 2016 (5:4:1) compared to 2015 (6:3:1). Reflecting the decrease in concrete mixing transport truck production, this may be attributed to fewer public works projects, as well as greater demand for feed.

The overall number of standard bulk carriers hit a low of 17,393 in 2011. Although the number has remained virtually unchanged since then, production in 2016 fell to 17,160 (96.2%), the lowest number since 2005.

4.3. Vans

The increase in logistical demand due to the economic recovery pushed the production of van trucks up by 9,686 units in 2016 to 78,109 units (114.2% of 2015). Van production has continued to increase since 2009 (37,984 units), more than doubling since that point. Apart from mini-vehicle van trucks, production of each class of van truck increased substantially in 2016 compared to 2015. Specifically, production of heavy-duty van trucks increased to 21,675 units (126.5%), medium-duty van trucks increased to 25,948 units (115.1%), light-duty van trucks increased to 29,095 units (107.3%), and mini-vehicle van trucks fell to 1,391 units (86.2%). According to use, production of ordinary goods van trucks increased to 19,477 units (109.5%), side-opening van trucks increased to 30,478 units (122.1%), and refrigerator and freezer van trucks increased to 25,211 units (111.7%). According to proportion of type, ordinary goods van trucks accounted for 24.9% of production, side-opening van trucks accounted for 39.0% of production, and refrigerator and freezer van trucks accounted for 32.3% of production. This shows that the proportion of side-opening van trucks has increased compared with 2015. According to body material, steel accounted for 1,347 units (a proportion of 1.7%), aluminum for 69,165 units (88.5%), and fiber reinforced plastic (FRP) for 7,597 units (9.7%). There were no major

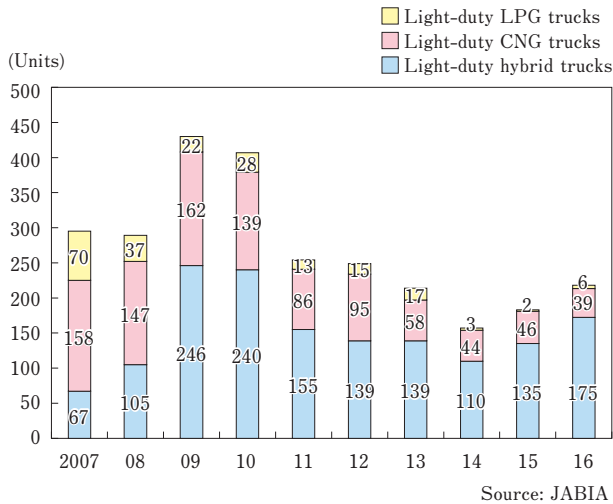


Fig. 5 Production volumes of hybrid and CNG garbage trucks.

changes in these proportions.

The overall number of standard van trucks has increased for six consecutive years from 832,809 units in 2010 to 869,278 in 2016.

5 Other Special Purpose Vehicles

5.1. Sanitation vehicles

The category of sanitation vehicles includes garbage trucks, garbage dump trucks, cesspool emptiers (also known as vacuum trucks), as well as cleaning trucks and road sweepers (i.e., dewatering trucks and trucks that clean by spraying water or using suction). Production of these vehicles in 2016 increased to 6,646 units (104.3% of 2015). According to type, production of garbage trucks increased by 225 units to 4,869 (104.8%), which accounted for 73.2% of all sanitation vehicle production. However, production of cesspool emptiers, the next most prevalent type of sanitation vehicle (14.2%) fell by 24 units to 947 (97.5%).

The overall number of standard garbage trucks has increased for twelve consecutive years, virtually unaffected by the global financial crisis, rising by 11,598 units from 71,126 in 2004 to 82,724 in 2016. Furthermore, the average service age from initial registration has continued to increase from 7.49 years in 2004 to 10.21 in 2016.

Figure 5 shows the production status of CNG and LPG garbage trucks, which have grown in popularity as environmental awareness has increased. Annual production of light- and medium-duty CNG and LPG-powered garbage trucks in 2016 was 45 units (93.8% of 2015), continuing the decreasing trend that started in 2007. In contrast, production of light-duty hybrid garbage trucks designed

to reduce both fuel consumption and emissions increased to 175 units in 2016 (129.6%). Production of this type of garbage truck is increasing, albeit at a slower rate than in 2009 and 2010, when purchasing incentives were available. Despite the gradual increase in low-polluting environmentally friendly hybrid, CNG, and LPG garbage truck production, these trucks only make up 4.7% of overall production, and are also limited to the light-duty vehicle class.

5.2. Detachable container trucks

Production of detachable container trucks in 2016 increased to 2,727 units (113.3% of 2015). According to class, production of heavy-duty detachable container trucks decreased to 561 units (96.4%), medium-duty detachable container trucks increased to 1,750 units (113.9%), and light-duty detachable container trucks increased to 405 units (145.2%). Heavy-duty detachable container trucks accounted for 20.6% of production, medium-duty trucks for 64.2%, and light-duty trucks for 14.9%. The proportion of heavy-duty trucks is decreasing, while that of light-duty trucks is increasing.

5.3. Aerial platforms

Although the production of aerial platforms fell to 4,065 units in 2011, production increased robustly to 6,610 units in 2013, 6,918 units in 2014, and 9,359 units in 2015. However, in 2016, production again fell sharply to 8,129 units (86.9% of 2015). In addition, as shown in Fig. 2, the 2016 production figure is less than the number produced in 2007 (15,065 units). Categories of aerial platforms include truck-mounted and self-propelled types. Truck-mounted aerial platforms are mainly used for electrical and communication system engineering work, whereas self-propelled aerial platforms tend to be found on construction sites, inside buildings and so on.

5.4. Truck-mounted cranes

This category of vehicle mostly comprises a crane mounted behind the cab of a flat-bed truck and is used for construction or building work, or for handling cargo. Production of truck-mounted cranes, which reached 15,876 units in 2007, fell as far as 4,565 units in 2009. Since then, the production of truck-mounted cranes increased for five consecutive years, reaching 16,848 units in 2014, before falling again in 2015. In 2016, production was 14,027 units, 89.9% of 2015.

5.5. Tailgate lifters

Tailgate lifters are mounted to the back of flat-bed trucks or van trucks as a typical labor-saving device for

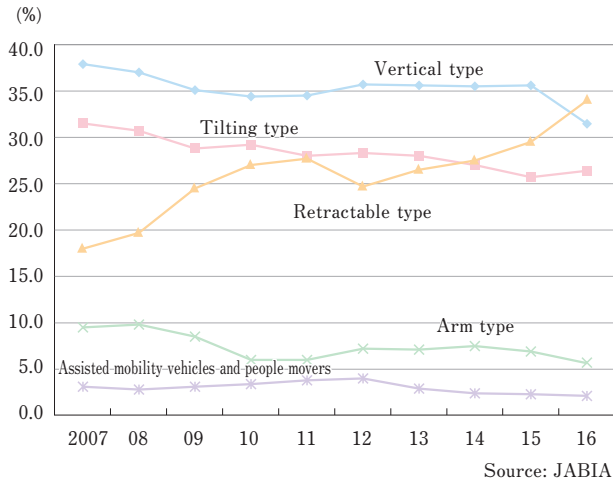


Fig. 6 Production proportion of tailgate lifters per type and use

handling cargo. Production of tailgate lifters in 2016 increased substantially through the 30,000-unit threshold to 32,639 (113.2% of 2015). According to type and use, vertical tailgate lifters decreased to 10,239 units (99.7%), tilting tailgate lifters increased to 8,633 units (116.3%), retractable tailgate lifters increased to 11,163 units (131.4%), arm-type tailgate lifters decreased to 1,892 units (95.5%), and tailgate lifters for assisted mobility vehicles and people movers increased to 712 units (106.4%). These large increases reflect the growing production of van trucks as economic recovery stimulates logistical demand, and the

growing requirement for labor-saving equipments to unload cargo as the number of female and elderly users increases.

Figure 6 shows the production proportion of tailgate lifters per type and use. Retractable tailgate lifters accounted for the largest proportion (34.2%), followed by vertical lifters, which led production trends up to 2015. The production of retractable tailgate lifters is likely to continue increasing for the foreseeable future.

5.6. Trailers

Trailers are used to transport large volumes or heavy items. In 2016, production increased to 7,561 units (108.9% of 2015). According to type, production of low-bed trailers increased to 258 units (107.5%), flat-bed trailers decreased to 1,608 units (95.1%), van-type trailers increased to 2,446 units (128.7%), trailers for containers increased to 2,107 units (110.4%), tanker trailers decreased to 346 units (93.8%), dump trailers decreased to 251 units (81.0%), vehicle carriers increased to 289 units (110.7%), and full trailers increased to 228 units (108.1%). According to proportion of type, the number of van-type trailers is increasing, while that of dump trailers is decreasing. The decline in the number of dump trailers mirrors the substantial drop in the production of whole-vehicle heavy-duty dump trucks.