
MAINTENANCE AND SERVICEABILITY

1 Introduction

With the introduction and popularization of limited-function self-driving vehicles on the horizon, the Japanese Ministry of Land, Infrastructure, Transport and Tourism (MLIT), which is in charge of automobile maintenance and inspection, has released the Report on System Development related to Advanced Technologies such as Autonomous Driving from the Automotive Subcommittee of the Land Transportation Commission of the Transportation Policy Council and the Final Report on Automotive Inspection Methods Utilizing In-Vehicle Fault Diagnosis Devices. Both of these reports propose ways to prepare technical measures and systems to ensure safety in the upcoming automobile society in anticipation of autonomous driving in the long term, as well as of the already growing computerization and sophistication, and accelerated propagation, of automotive technologies.

In addition, the Review Panel on Advancement of Automotive Maintenance Technologies, which has been meeting since 2011, is also holding discussions on the maintenance and management required for highly computerized or other vehicles in use and the continuous updating of their software.

This point to the construction of a new system for maintenance, inspection, and certification to ensure the safety of autonomous driving technologies and associated equipment without the need for human cognition, judgment, or operation.

1.1. Vehicle Market in 2018

In 2018, 5,272,067 new vehicles were sold in Japan, representing an increase of 37,902 vehicles or 0.7% compared to the 5,234,165 new vehicles sold the previous year.

A more detailed analysis of new vehicle sales reveals that the number of registered vehicles was 3,347,943, a decrease of 42,881 (1.3%) from the previous year.

At the same time, sales of mini-vehicles reached 1,924,124 vehicles, an increase of 80,783 (4.4%) from the previous year. This is the second year in a row that sales of new mini-vehicles have increased.

Sales of new mini-vehicles accounted for 36.5% of all new vehicle sales, also presenting an increase for a second consecutive year.

For used vehicle sales, the number of registered vehicles was 3,837,482, a decrease of 28,459 (0.7%) from the previous year. Used mini-vehicle sales were 3,113,916 vehicles, an increase of 42,339 (1.4%) from the previous year. This means that sales of both new and used mini-vehicles have increased for two years in a row.

The number of registered, domestically-produced hybrid vehicles (HVs) sold in Japan in 2018 was 1,097,927 vehicles, an increase of 2,550 vehicles (0.2%) compared to the previous year. The number of imported hybrid vehicles was 6,813, a massive increase of 5,930 vehicles (771.6%) compared to the previous year.

The number of domestically-produced plug-in hybrid vehicles (PHVs) sold in Japan in 2018 was 19,730 vehicles, a decrease of 11,774 vehicles (37.4%) compared to the previous year. The number of imported PHVs was 3,510, a decrease of 987 vehicles (22.0%) compared to the previous year.

The number of registered, domestically-produced electric vehicles (EVs) sold in 2018 was 25,764 vehicles, while the number of imported EVs was 701 vehicles, bringing total EV sales to 26,465 vehicles, an increase of 8,272 vehicles (45.5%) compared to the previous year. The number of fuel cell vehicles (FCVs) sold in Japan in 2018 was 606 vehicles, a decrease of 243 vehicles (28.6%) compared to the previous year.

According to data collected by MLIT, the installation rate of various driving support technologies in new passenger cars produced in Japan in 2017 was as follows: 77.8% for automatic brakes, 65.2% for acceleration suppression devices when the accelerator pedal is pressed

by mistake, 19.8% for lane keeping assist systems, and 47.5% for adaptive cruise control. This indicates that these technologies and devices have been widely adopted on automobiles at a rapid pace since 2012, the first year for which these statistics are available.

1.2. Vehicle Ownership Trends in 2018

At the end of December 2018, the number of vehicles owned in Japan was 82,192,828, the ninth consecutive increase from 2010 and the seventh straight year to set a record high. Compared to the previous year (2017), this was an increase of 246,792 vehicles (0.3%).

According to model type, the number of 4-wheeled registered vehicles was 47,450,721, a decline of 25,859 (0.1%) from the previous year.

The number of 4-wheeled mini-vehicles owned in Japan broke through the 30-million-vehicle mark in 2015 and has continued to increase. By the end of December 2018, it stood at 31,013,373 vehicles. This was an increase of 242,095 vehicles (0.8%) compared to the previous year, and indicates that the growth rate has also risen slightly.

The number of inspected 2-wheeled vehicles owned in Japan also increased to 1,704,974. This was an increase of 18,778 vehicles (1.1%) compared to the previous year, indicating that the number of such vehicles owned in Japan has continued to increase and that the rate of growth has also risen slightly. The number of 2-wheeled mini-vehicles owned in Japan was 2,003,335. This was 10,810 (0.5%) more than the previous year and once again reached the 2 million vehicle mark.

The number of mini-vehicles owned in Japan as a percentage of the total number of 4-wheeled registered and mini-vehicles (78,464,094) rose by 0.2% from the previous year, reaching a record 39.5%, again leveling off just below the 40% mark.

According to a study by the Automobile Inspection & Registration Information Association (AIRIA), the average age of registered passenger vehicles at the end of March 2018 was 8.60 years. This is 0.07 years longer than the previous year and also means that the average vehicle age has continued to rise for 26 years in succession. This is the highest average vehicle age in history, a record that has been broken annually for the past 24 years. The average vehicle age has increased by 1.37 years compared to 10 years earlier in 2008. The average number of years of usage for registered passenger vehicles in Japan was 13.24 years, a 0.33-year increase over the 12.91 years value of the previous year, achieving a

record high for three consecutive years.

At the same time, the average age of registered trucks at the end of March 2018 was 11.41 years, 0.09 years more than the 11.32-year value of the previous year and the highest in history after rising for 26 years in succession.

A breakdown of the different truck models shows that the average age of normal size trucks is 12.20 years, an increase of 0.09 years compared to the previous year. The average age of light-duty trucks is 10.88 years, an increase of 0.08 years compared to the previous year. This sets a record for a 27th consecutive year.

The average age of buses in Japan was 11.81 years, a decrease of 0.03 years compared to the previous year, marking two years of consecutive decrease. In addition, the average age of special-purpose vehicles in Japan in 2018 was 10.99 years, an increase of 0.06 years compared to the previous year. The average age of heavy-duty special-purpose vehicles was 20.69 years, an increase of 0.11 years compared to the previous year, while the average age of light-duty motorcycles was 15.28 years, an increase of 0.31 years compared to the previous year.

Figure 1 shows the change in the average number of years of usage for different types of registered vehicle models.

Looking at the breakdown of vehicles owned in Japan by vehicle age indicates that for registered passenger vehicles, the number of vehicles 10 years or older as of the end of March 2018 was 14,495,537, an increase of just 451 vehicles. These older vehicles accounted for 36.7% of the total number of registered passenger vehicles, the same level as the previous year (Fig. 2).

According to an investigation by the Light Motor Vehicle Inspection Organization (LMVIO), the current average age of passenger mini-vehicles at the end of December 2018 was 8.50 years. This is 0.13 years older than the average age of 8.37 years recorded in December 2017. This organization first started recording this data for mini-vehicles in 2005, at which time their average age was 6.13 years. Since then, it has increased by 2.37 years, or over 38%, marking 13 consecutive years of increase.

The average age of mini-vehicle trucks at the end of December 2018 was 12.69 years, exceeding the average age of 12.53 years recorded in 2017 by 0.16 years.

The average number of years of usage of passenger mini-vehicles was 14.55 years at the end of December 2017. In 2018, this had increased by 0.18 years to 14.73

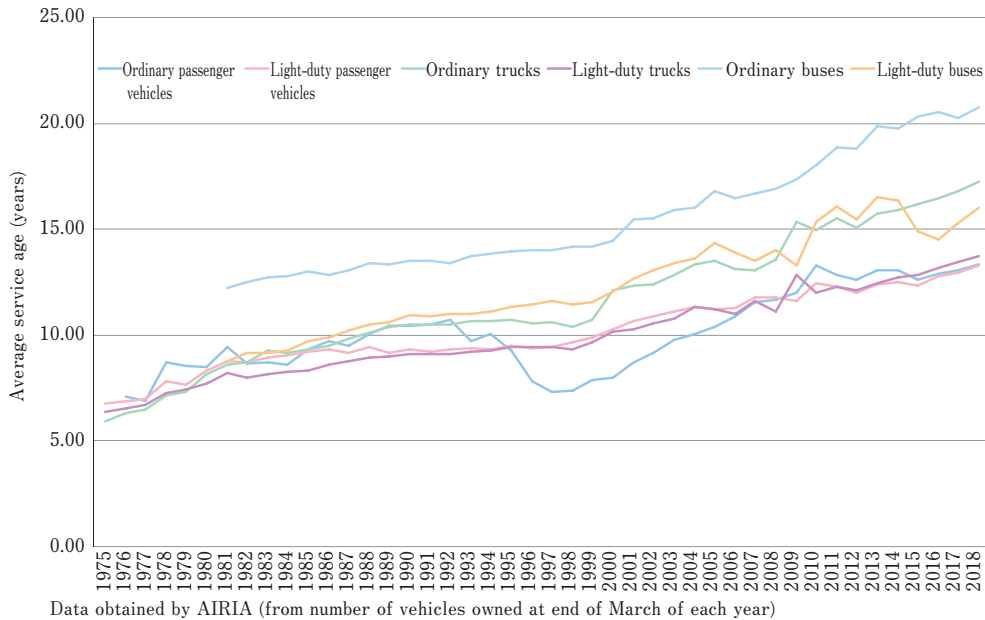


Fig. 1 Trends in Average Number of Years of Usage (Average Vehicle Age) According to Vehicle Type

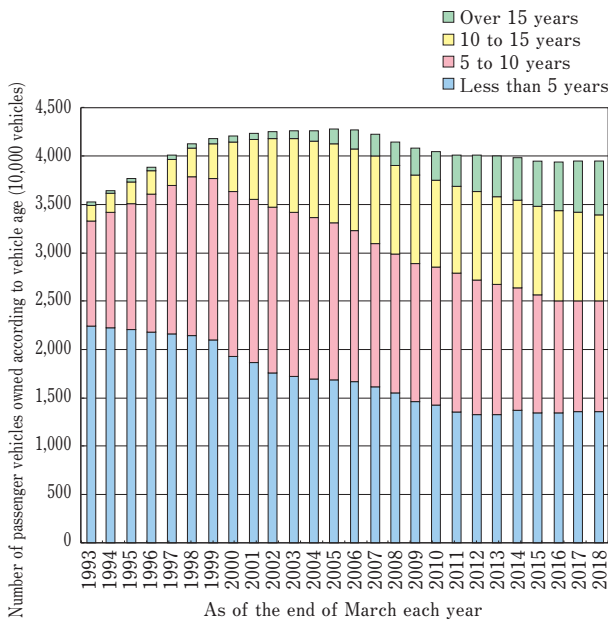


Fig. 2 Trends in Vehicle Age Breakdown of the Total Number of Passenger Vehicles Owned

years. Therefore, the average vehicle age has increased by 3.24 years compared its age of 11.49 years recorded 13 years earlier in 2005. Mini-vehicle trucks exhibit the same trend, with their average age of 16.42 years in 2017 increasing by 0.10 years to 16.52 years in 2018.

The total number of registered HVs and PHVs owned in Japan at the end of March 2018 was 7,539,094, an increase of 970,134 vehicles (14.8%) compared to the previous year. The number of EVs owned in Japan was 93,145, which is 17,581 vehicles (23.7%) more than the previous

year. The number of FCVs owned in Japan was 2,449, representing an increase of 636 vehicles (35.1%) compared to the previous year. The total number of HVs, PHVs, EVs, and FCVs (electric-powered vehicles) owned in Japan was 7,634,688 vehicles, an increase of 988,621 (14.9%) compared to the previous year. This accounted for 9.4% of the total number of vehicles owned in Japan (81,563,101) and represents an increase of 1.2 percentage points from the 8.2% recorded during the previous year.

The total number of electric-powered mini-vehicles owned in Japan at the end of March 2018 was 18,858 vehicles, or 50 vehicles (0.3%) more than the previous year. A breakdown of these vehicles owned in Japan reveals that 18,337 of them are type designation vehicles, 265 of them are type designation vehicles with modifications, and the remaining 256 are parallel imports or other types of vehicles.

2 Recent Trends in the Vehicle Maintenance Industry

The Japan Automobile Service Promotion Association (JASPA) conducted its 2018 survey of the vehicle repair and maintenance industry at the end of June 2018. The survey targeted vehicle repair and maintenance businesses defined by the Road Transport Vehicle Act and was sent to approximately 20% of the 91,883 businesses, according to category and size. Responses were received from 8,193 of these workplaces.

The sales volume and other values reported were those from the accounting period closest to the time of the survey at the end of June 2018 (e.g., from the 2017 fiscal year). According to this survey, the total maintenance sales were 5 trillion 529.5 billion yen, an increase of 42 billion yen (0.8%) compared to the results of the previous year's survey.

For the purpose of the vehicle repair and maintenance industry survey, the target vehicle repair and maintenance businesses were classified as follows: full-time vehicle maintenance shops (workplaces other than vehicle dealers where maintenance sales account for over 50% of total sales), maintenance shops run as an additional business (workplaces where sales from other businesses, such as vehicle sales, parts and accessory sales, insurance sales, or gasoline sales, account for over 50% of total sales), maintenance shops at vehicle dealers (workplaces at companies that have signed an exclusive distributor agreement with an automaker or a domestic exclusive retailer), and private owner-run maintenance shops (mainly workplaces that perform maintenance work on vehicles that are privately owned).

2.1. Maintenance Facilities and Maintenance Personnel

2.1.1. Outline of Maintenance Facilities

The number of businesses in the vehicle repair and maintenance industry was 73,018 at the time of the survey on June 30, 2018, a decrease of 65 businesses (0.1%) compared to the previous year. This was the fourth consecutive year that this number decreased.

The total number of workplaces (number of certified maintenance shops) was 91,883. This was a decrease of 118 such workplaces (0.1%) compared to the previous year. This is also the third consecutive year that this value has decreased.

When the number of workplaces was examined according to the types of business, full-time vehicle maintenance shops accounted for the majority at 56,270 (61.2% of the total number of such workplaces). This represented a decrease of 598 workplaces (1.1%) compared to the previous year. Maintenance shops run as an additional business accounted for 15,723 workplaces (17.1% of the total), an increase of 391 shops (2.6%) from the previous year. The number of maintenance shops at vehicle dealers was 16,252 (17.7% of the total), an increase of 72 workplaces from the previous year. This was the first increase in the number of dealer-based maintenance shops

increased in three years. The number of private owner-run maintenance shops was 3,638 (4.0% of the total). This was an increase of 17 such workplaces (0.5%) from the previous year, and the first increase in four years (Table 1).

The number of designated workshops (i.e., private shops permitted to carry out the Japanese shaken vehicle inspection) has increased consistently since the system was established in 1962 and sets a record high every year. In the 2018 survey, the number of such workshops exceeded 30,000 to reach 30,075, an increase of 92 (0.3%) from the previous year. The number of workplaces that have obtained this designation (i.e., the designation acquisition ratio) is 32.7% of the total number of workplaces (Table 2).

Examining the designation acquisition ratio according to the different types of businesses shows that 13,425 of the total number of full-time vehicle maintenance shops (56,270) have obtained the designation, a decrease of 121 shops (0.9%) compared to the previous year. This represents a designation acquisition ratio of 23.9%, as well as an increase of 1,065 shops (8.6%) compared to 10 years earlier in 2008.

In the case of maintenance shops run as an additional business, 4,839 of the total 15,723 have obtained the designation, an increase of 156 shops (3.3%) from the previous year. This represents a designation acquisition ratio of 30.8%, as well as an increase of 180 shops (3.9%) compared to the number in 2008.

Among the 16,252 maintenance shops at vehicle dealers, 10,584 have obtained the designation. This is an increase of 51 (0.5%) from the previous year and represents a designation acquisition ratio of 65.1%, but also constitutes a decrease of 93 shops (0.9%) from 2008.

Of the 3,638 private owner-run maintenance shops, 1,227 have obtained the designation. This is an increase of 6 shops (0.5%) from the previous year, representing a designation acquisition ratio of 33.7%. It also represents an increase of 7 shops (0.6%) from 2008.

Table 2 compares the scale of the maintenance shops based on the number of vehicle maintenance personnel employed there and other factors.

At the time of this survey at the end of June 2018, there were 72,634 private companies after subtracting the number of public offices. However, at the time of the June 2008 survey 10 years earlier, there were 71,798 private companies after subtracting the number of public

Table 1 Maintenance Sales Volume, Composition Ratio, and Rate of Change Compared to Previous Year According to Type of Business and Work Content

(Sales volume units: hundred million yen)

Work content		Vehicle inspection (shaken) maintenance			Regular inspection and maintenance				Collision repair	Other maintenance	Total	Number of shops and composition ratio	Number of mechanics and composition ratio
		2 years	1 year	Subtotal	1 year	6 months	3 months	Total					
Full-time	Sales volume	5,635	3,389	9,024	310	116	310	736	3,931	5,673	19,364	56,270	162,822
	Proportion	34.5%	59.5%	46.6%	11.9%	23.3%	56.1%	3.8%	36.5%	30.1%	116.9%	61.2%	48.1%
	Change in sales volume compared to previous year	-309	-22	-331	-49	16	-9	-42	-78	-132	-583	-598	-197
	Ratio of increase or decrease compared to previous year	94.8%	99.4%	96.5%	86.4%	116.0%	97.2%	94.6%	98.1%	97.7%	97.1%	98.9%	99.9%
Additional business	Sales volume	2,457	597	3,054	181	34	40	255	1,282	2,122	6,713	15,723	50,964
	Proportion	36.6%	8.9%	45.5%	2.7%	0.5%	0.6%	3.8%	19.1%	31.6%	100.0%	17.1%	15.1%
	Change in sales volume compared to previous year	130	-38	92	-4	1	-6	-9	-93	112	102	391	2,428
	Ratio of increase or decrease compared to previous year	105.6%	94.0%	103.1%	97.8%	103.0%	87.0%	96.6%	93.2%	105.6%	101.5%	102.6%	105.0%
Full-time + additional business	Sales volume	8,092	3,986	12,078	491	150	350	991	5,213	7,795	26,077	71,993	213,786
	Proportion	31.0%	15.3%	46.3%	1.9%	0.6%	1.3%	3.8%	20.0%	29.9%	100.0%	78.4%	63.2%
	Change in sales volume compared to previous year	-179	-60	-239	-53	17	-15	-51	-171	-20	-481	-207	2,231
	Ratio of increase or decrease compared to previous year	97.8%	98.5%	98.1%	90.3%	112.8%	95.9%	95.1%	96.8%	99.7%	98.2%	99.7%	101.1%
Dealer	Sales volume	7,486	1,400	8,886	2,046	323	188	2,557	5,116	10,368	26,927	16,252	109,301
	Proportion	27.8%	5.2%	33.0%	7.6%	1.2%	0.7%	9.5%	19.0%	38.5%	100.0%	17.7%	32.3%
	Change in sales volume compared to previous year	269	67	336	111	62	5	178	-244	510	780	72	-84
	Ratio of increase or decrease compared to previous year	103.7%	105.0%	103.9%	105.7%	123.8%	102.7%	107.5%	95.4%	105.2%	103.0%	100.4%	99.9%
Private owner-run	Sales volume	734	309	1,043	62	25	15	102	454	692	2,291	3,638	15,351
	Proportion	32.0%	13.5%	45.5%	2.7%	1.1%	0.7%	4.5%	19.8%	30.2%	100.0%	4.0%	4.5%
	Change in sales volume compared to previous year	89	91	180	-38	-20	-41	-99	3	37	121	17	-69
	Ratio of increase or decrease compared to previous year	113.8%	141.7%	120.9%	62.0%	55.6%	26.8%	50.7%	100.7%	105.6%	105.6%	100.5%	99.6%
Total	Sales volume	16,312	5,695	22,007	2,599	498	553	3,650	10,783	18,855	55,295	91,883	338,438
	Proportion	29.5%	10.3%	39.8%	4.7%	0.9%	1.0%	6.6%	19.5%	34.1%	100.0%	100.0%	100.0%
	Change in sales volume compared to previous year	179	98	277	20	59	-51	28	-412	527	420	-118	2,078
	Ratio of increase or decrease compared to previous year	101.1%	101.8%	101.3%	100.8%	113.4%	91.6%	100.8%	96.3%	102.9%	100.8%	99.9%	100.6%

Table 2 Number of Vehicle Maintenance-Related Personnel

Scale of business	A1 (2 to 3 people)	A2 (4 to 10 people)	B (11 to 20 people)	C (21 to 30 people)	D (31 people or more)	Total	Change from previous year	Rate compared to previous year
Number of shops	50,847	36,868	3,593	444	131	91,883	-118	99.9%
Number of shops that obtained designation		27,021	2,634	325	95	30,075	92	100.3%
Acquisition ratio		73.3%	73.3%	73.2%	72.5%	32.7%		
Total number of personnel	154,107	294,330	66,107	13,952	6,922	535,418	1,139	100.2%
Number of female personnel within that total	31,602	40,443	5,833	1,099	396	79,373	832	101.1%
Total number of maintenance personnel	120,257	213,510	49,246	10,793	5,568	399,374	-343	99.9%
Number of female maintenance personnel within that total	9,972	6,514	623	149	65	17,323	-559	96.9%
Number of Class 1 auto mechanics	1,494	6,726	1,864	222	67	10,373	419	104.2%
Number of female mechanics within that total	85	29	7	3	1	125	6	105.0%
Number of Class 2 auto mechanics	78,323	153,124	34,669	6,842	2,944	275,902	1,079	100.4%
Number of female mechanics within that total	2,162	1,634	197	64	8	4,065	85	102.1%
Number of Class 3 auto mechanics	18,958	26,143	5,005	1,395	662	52,163	580	101.1%
Number of female mechanics within that total	4,459	1,874	76	6	0	6,415	-394	94.2%
Total number of mechanics	98,775	185,993	41,538	8,459	3,673	338,438	2,078	100.6%
Number of female mechanics within that total	6,706	3,537	280	73	9	10,605	-303	97.2%

The number of women was also surveyed starting in June 2014.

Table 3 Number of Businesses According to Number of Employees

	2 to 5 people	6 to 10 people	11 to 15 people	16 to 20 people	21 to 30 people	31 to 50 people	51 to 100 people	101 to 300 people	More than 300 people	Private company total	Public offices	Overall total
June 2008	35,566	18,260	7,314	4,768	3,463	2,023	371	29	4	71,798	203	72,001
June 2018	40,538	16,752	5,016	2,290	2,111	1,888	1,480	1,706	853	72,634	384	73,018
Change	4,972	-1,508	-2,298	-2,478	-1,352	-135	1,109	1,677	849	836	181	1,017

offices. Table 3 compares them based on the number of employees.

2.1.2. Outline of Mechanics and Maintenance Personnel

At the time of the survey at the end of June 2018, the number of maintenance-related personnel was 535,418, an increase of 1,139 (0.2%) from the previous year.

When these changes in the numbers of maintenance-related personnel are examined by business type, the full-time vehicle maintenance businesses employed 254,870 people, a decrease of 4,807 (1.9%) from the previous year. Vehicle maintenance businesses run as an additional business employed 92,702 people, 4,091 (4.6%) more than the previous year. Similarly, the number of maintenance-related personnel at maintenance shops at vehicle dealers increased to 166,024 people, 5,414 (3.4%) more than the previous year. In private owner-run maintenance shops, the number of such personnel decreased significantly for a seventh consecutive year, falling to 21,822 people, which is 3,559 (14.0%) less than the previous year.

The number of maintenance personnel (shop workers) was 399,374, a decrease of 343 people from the previous year. This was also the seventh consecutive year that this number decreased.

The number of mechanics was 338,438 people, an increase of 2,078 (0.6%) from the previous year. The number of female mechanics within this total has been recorded since the June 2014 survey, when there were 9,527. That number then increased in both 2015 and 2016, but then declined after peaking at 10,935 in 2016. According to the June 2018 survey results the number of female mechanics was 10,605, a decrease of 303 from the previous year.

Tables 1 and 2 show the current situation of maintenance-related personnel in Japan.

After reaching a peak of 347,276 people in the 2011 survey results, the total number of mechanics decreased for the next five years. However, the results of the 2017 survey showed an increase in the total number of per-

sonnel who obtained one of the Class 1, Class 2, or Class 3 vehicle mechanic qualifications. In the 2018 survey, the total number of mechanics from all classes increased by 2,078 people or 0.6% compared to the previous year.

The average age of maintenance personnel continues to rise, reaching 45.3 years old in 2018, an increase of 0.3 years compared to the previous year. Broken down by the different types of businesses, full-time vehicle maintenance shops showed the most remarkable increase, with an average age of 50.8 years old, an increase of 0.5 years compared to the previous year. The youngest were the maintenance personnel at the vehicle dealers with an average age of 35.3 years old, but even this was up 0.3 years from the previous year.

2.1.3. Measures to Ensure Sufficient Numbers of Trained Mechanics

The number of people who took the JASPA registration test to acquire a mechanic qualification was 45,016 in 2015, and that number then decreased for two straight years. However, in 2018 the number of people who took the test increased by 1,124 people from the previous year to reach 40,171. The number of people who passed the test in 2018 was 29,689, which was 1,356 less than the previous year.

According to the School Basic Survey of the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT), in 2018 there were 8,926 students who applied for admittance to the vehicle maintenance departments of vocational schools that train mechanics relative to a total student capacity of 12,674, and 8,124 students were ultimately admitted, marking a continued trend of under-enrollment.

In 1991, the Japanese automobile industry established the Japan Automobile Education Foundation (JAEF). This organization has been providing automotive technology educational materials to industrial high schools and other vocational schools teaching vehicle mechanics courses. The foundation also regularly conduct activities that provide a wide range of materials related to automobiles to regular high schools, and also holds workshops

for teachers to raise interest in automotive technologies and maintenance.

In April 2014, with the cooperation of the Japanese Ministry of Land, Infrastructure, Transport and Tourism (MLIT), JASPA, the Japan Automobile Dealers Association (JADA), the Japan Automobile Manufacturers Association (JAMA), JAEF, and other automotive-related organizations established a council (currently composed of 16 organizations) to promote the recruitment and training of vehicle maintenance personnel. JASPA continues its activities as the secretariat and management group for this council. In 2018 the council's activities included the use of its website to provide information about schools that specialize in training automobile mechanics, and visiting high school principals and career advisors (at 577 schools nationwide) with the cooperation of MLIT. In addition, the council activities included promoting greater understanding of the car maintenance industry, providing information about choosing a profession in that field, offering support for hands-on events for children, creating an automobile mechanic video documentary presented on YouTube and the council's website, and developing promotional posters for automobile mechanics that were then put up at high schools, local government offices, and automobile dealerships.

Following lobbying by JASPA to add automobile maintenance to the Technical Intern Training Program for foreign nationals living in Japan, the Ministry of Health, Labor and Welfare (MHLW) approved the automobile maintenance skills practical training evaluation test for foreign nationals, and added "automobile maintenance occupation (automobile maintenance work)" as a job classification subject to the No. 2 technical intern training transfer. This was publicly announced in an official gazette on April 1, 2016. Taking advanced level examinations became possible starting on November 1, 2017. In 2018, 793 students took the beginner level exam, and 11 students passed the professional exam. Although there was a retest, all of the students passed.

This brought the total number of people who passed the practical training evaluation test to 1,165 for the beginner level exam and 11 for the professional exam.

In an effort to contribute to international development, this program allows foreigners from emerging countries to stay in Japan for a fixed period, receiving them as foreign technical intern trainees at automobile maintenance shops and teaching them the applicable skills.

As of October 2018, there are 1,849 foreigners, including technical interns and international students, working in the automobile maintenance industry in Japan at 699 workplaces (according to the MHLW).

2. 2. Demand for Vehicle Maintenance

2. 2. 1. Trends in Total Maintenance Sales Volume

The total maintenance sales volume in the 2018 survey of the situation in the vehicle maintenance industry (results from the 2017 fiscal year) was 5 trillion 529.5 billion yen. Table 1 compares the maintenance sales volume generated by full-time vehicle maintenance businesses, those run as an additional business, those at dealers, and those at private owner-run businesses. It also compares the sales volume according to the content of the work performed, such as shaken vehicle inspection and maintenance, regular inspection and maintenance, collision repairs, and other maintenance (e.g., extraordinary maintenance due to a breakdown or malfunction, simple maintenance such as oil changes, voluntary inspection and maintenance requested by the owner, re-inspection of a vehicle issued a limited vehicle inspection certificate, or customization services).

When the total vehicle maintenance sales are examined by business type, maintenance sales at full-time vehicle maintenance businesses accounted for 1 trillion 936.4 billion yen, a decrease of 58.3 billion yen (2.9%) compared to the previous year.

Maintenance sales at vehicle maintenance businesses run as an additional business amounted to a total of 671.3 billion yen, an increase of 10.2 billion yen (1.5%) compared to the previous year.

The total for vehicle maintenance sales at maintenance shops at vehicle dealers amounted to 2 trillion 692.7 billion yen, an increase of 78 billion yen (3.0%) compared to the previous year.

The total vehicle maintenance sales at private owner-run vehicle maintenance businesses were 229.1 billion yen, an increase of 12.1 billion yen (5.6%) compared to the previous year.

Breaking down the 2018 overall total maintenance sales volume of 5 trillion 529.5 billion yen by type of maintenance work shows that shaken vehicle inspection and maintenance sales amounted to 2 trillion 200.7 billion yen, an increase of 27.7 billion yen (1.3%) compared to the previous year. This accounted for 39.8% of the total maintenance sales volume. Regular inspection and maintenance sales amounted to 365 billion yen, an increase of

2.8 billion yen (0.8%) compared to the previous year, and representing 6.6% of the overall total.

Collision repairs amounted to 1 trillion 78.3 billion yen, a decrease of 41.2 billion yen (3.7%) compared to the previous year. This accounted for 19.5% of the total sales volume. Finally, other maintenance sales amounted to 1 trillion 885.5 billion yen, an increase of 52.7 billion yen (2.9%) compared to the previous year, and making up 34.1% of the overall total.

Maintenance sales from collision repair work have decreased significantly for five consecutive years, reaching a total decrease of 195.8 billion yen (15.4%) during that period.

The number of traffic accidents in Japan peaked at 952,709 in 2004. In 2018, there were 430,345 accidents, which was 41,724 (8.8%) fewer than the previous year. Since 2004, the number of traffic accidents has decreased by 522,364 (54.8%). The sales volume of vehicle collision repairs reflects the effectiveness of advances in automatic braking systems and other safety technologies at reducing the occurrence accidents.

2.2.2. Average Number of Vehicles Serviced According to Type of Business and Work Content

The annual average number of vehicles brought in for maintenance service per shop was 1,657, a decrease of 35 vehicles (2.1%) from the previous year. Broken down according to the content of the work performed, the average number of vehicles brought in for shaken vehicle inspection and maintenance service per shop was 363, or 3 vehicles (0.8%) less than in the previous year. This accounted for 21.9% of the 1,657 vehicles brought in per shop on average. The average number of vehicles brought in for regular inspection and maintenance per shop was 253, or 11 vehicles (4.5%) more than in the previous year, representing 15.3% of the total. The average number of vehicles brought in for collision repairs per shop was 83. This was a decrease of 6 vehicles (6.7%) from the previous year and accounted for 5.0% of the total number of vehicles brought in. The average number of vehicles brought in for other maintenance per shop was 959, a decrease of 36 vehicles (3.6%) from the previous year, and accounting for 57.8% of the total.

Looking at the average number of vehicles brought in for maintenance per shop during the year according to the type of business, the average number of vehicles brought into full-time vehicle maintenance businesses

was 787, a decrease of 29 vehicles (3.6%) from the previous year. For maintenance shops run as an additional business, the average number was 1,290 per shop, an increase of 14 vehicles (1.1%) from the previous year. The average number for maintenance shops at dealers was 5,040 vehicles per shop, a decrease of 249 vehicles (4.7%) from the previous year.

Furthermore, looking at the content of maintenance work according to the type of business, the average number of vehicles brought into full-time vehicle maintenance businesses for shaken vehicle inspection and maintenance during the year was 271 per shop, a decrease of 3 vehicles (1.1%) from the previous year. This also accounted for 34.4% of all the vehicles brought into those shops for maintenance. For maintenance shops run as an additional business, the average number of vehicles brought in for shaken vehicle inspection and maintenance was 351 per shop, an increase of 11 vehicles (3.2%) from the previous year and representing 27.2% of the total. At the same time, the average number of vehicles brought into maintenance shops at dealers for shaken vehicle inspection and maintenance was 692, a decrease of 31 vehicles (4.3%) from the previous year and making up 13.7% of the total.

Next, the average number of vehicles brought into full-time vehicle maintenance businesses for regular inspection and maintenance during the year was 80 vehicles per shop, a decrease of 2 vehicles (2.4%) from the previous year. This accounted for 10.2% of all the vehicles brought into those shops for maintenance during the year. For maintenance shops run as an additional business, the average number of vehicles brought in was 108 per shop, a decrease of 10 vehicles (8.5%) from the previous year, and accounting for 8.4% of the total. The average number of vehicles brought into maintenance shops at dealers for regular inspection and maintenance was 997 vehicles per shop, an increase of 49 vehicles (5.2%) compared to the previous year. This accounted for 19.8% of the vehicles brought into those shops for maintenance.

The average number of vehicles brought in for collision repairs during the year was 63 vehicles per shop at full-time vehicle maintenance businesses, a decrease of 1 vehicle (1.6%) from the previous year. This accounted for 8.0% of all the vehicles that were brought into those shops for maintenance service. For maintenance shops run as an additional business, the average number of vehicles brought in for collision repairs was 75 per shop, an

increase of 1 vehicle (1.4%) from the previous year. This accounted for 5.8% of all the vehicles brought in for maintenance service. The average number of vehicles brought into maintenance shops at dealers for collision repairs was 159 vehicles per shop, a decrease of 36 vehicles (18.5%) from the previous year. This accounted for 3.2% of all the vehicles brought in for maintenance service at those shops.

The category of “other maintenance” accounted for the largest portion of vehicles brought in for maintenance or service. The average number of vehicles brought into full-time vehicle maintenance businesses during the year for other maintenance was 373 per shop, a decrease of 23 vehicles (5.8%) from the previous year. This accounted for 47.4% of all the vehicles brought into those shops for maintenance during the year. For maintenance shops run as an additional business, the average number of vehicles brought in for other maintenance was 757 per shop, an increase of 13 vehicles (1.7%) from the previous year. This accounted for 58.6% of all the vehicles brought in to those shops for maintenance service. Finally, the average number of vehicles brought into maintenance shops at dealers for other maintenance was 3,193 per shop, a decrease of 230 vehicles (6.7%) from the previous year, and accounting for 63.3% of the total.

2. 2. 3. Trends in Shaken Vehicle Inspection and Regular Inspection Maintenance Fees According to Type of Business

Two-year vehicle inspections account for over three-quarters of the shaken vehicle inspection sales volume. Comparing the unit prices of the two-year vehicle inspection fees at the different types of businesses, the unit price at full-time vehicle maintenance businesses was 48,887 yen, a decrease of 1,426 yen (2.8%) over the unit price of the previous year. Similarly, the unit price at maintenance shops run as an additional business was 51,798 yen, a decrease of 160 yen (0.3%) compared to the previous year. However, at maintenance shops at dealers, the unit price was 73,225 yen, an increase of 4,990 yen (7.3%) compared to the previous year.

The price difference between the two-year shaken vehicle inspection fees at full-time vehicle maintenance businesses and maintenance shops at dealers was 24,338 yen, an increase of 6,416 yen compared to the survey results from the previous year.

One-year vehicle inspections account for approximately three-quarters of the regular inspection and maintenance

sales volume. A comparison of the average unit price for such inspections at the different types of businesses reveals that it cost 18,358 yen at full-time vehicle maintenance businesses. This was a decrease of 1,510 yen (7.6%) compared to the previous year.

Similarly, the unit price at maintenance shops run as an additional business was 17,779 yen, a decrease of 164 yen (0.9%) compared to the previous year. However, at maintenance shops at dealers, the unit price was 18,721 yen, an increase of 785 yen (4.4%) compared to the previous year.

2. 3. Promotion of Information Communications Technology (ICT)

2. 3. 1. Application of Shaken Renewal Inspection One-Stop Service (OSS)

The one stop service (OSS) for vehicle ownership-related procedures is a service that allows administrative procedures that differ by government agency, such as automobile registration and inspection, vehicle storage location certification, as well as the payment of vehicle taxes and declaration of tax payment, to be collectively carried out online. More than 40 million applications for automobile ownership-related procedures are submitted every year in Japan, an enormous volume compared to other administrative procedures. Given the many benefits an OSS entails for Japanese citizens, 11 prefectures began operating such a service for the first-time registration of new vehicles in December 2005. In April 2017, the application of this OSS was expanded to cover shaken renewal inspections, used vehicle sales, and changes of address. Furthermore, the shaken renewal inspection service was made immediately available in all 47 prefectures of Japan.

Designated maintenance business operators can use the OSS to carry out the procedures for shaken renewal inspection requested by vehicle owners, meaning that the operators will only go to the transportation department to take delivery of documents such as new/old vehicle inspection certificates and inspection stickers. Other procedures, including the issuance of automobile liability insurance and safety regulations conformity certificate will be performed via the internet from the operator's workplace, and the processing of payments for inspection fees and the automobile weight tax will also be carried out directly from the bank account of the designated plant.

At the same time, JASPA, regional automobile service

promotion associations, and the Automobile Inspection & Registration Information Association (AIRIA) have built a shaken renewal inspection OSS usage framework for the maintenance industry.

JASPA was registered with MLIT as a registered information processing organization empowered to manage the digitized safety regulations conformity certificates as stipulated in the Road Transport Vehicle Act, and began to do so on April 1, 2017. At the same time, an ordinance from the Ministry of Internal Affairs and Communications (MIC) was also revised to exempt JASPA from the Administrative Scrivener Act, and allow that association to perform proxy application tasks for the shaken renewal inspection OSS. Automobile service promotion associations in the prefectures will act as JASPA branches and serve as application agents who will handle the applications submitted by the local designated maintenance business operators in regard to the shaken renewal inspection OSS.

In 2018 the number of businesses registered with the electronic safety regulations conformity certificate system was 6,729, the number of registered workplaces was 17,002, and the number of registered certificates increased tenfold from the 568,949 certificates in 2017, to 5,820,943. The number of businesses registered to perform proxy applications with the shaken renewal inspection OSS in 2018 also increased significantly to 1,616 businesses (there were 317 in 2017), while the number of applications filed by proxy amounted to 161,982 cases (there were 5,025 cases in 2017).

At the same time, MLIT established an investigative commission in September 2018 to examine the digitization of automobile inspection certificates. The digitization of these certificates will eliminate the need to go to the transportation department branch office to exchange the old and new vehicle inspection certificates under the shaken renewal inspection OSS. This means that all OSS procedures can be completed completely online, which in turn will greatly reduce the burden on designated maintenance businesses. The commission is also examining how these digitized automobile inspection certificates can be further utilized in the future.

The Light Motor Vehicle Inspection Organization (LMVIO) is also examining the possibility of starting operation of a shaken renewal inspection OSS for mini-vehicles.

2. 3. 2. State of FAINES Usage

JASPA began operating the FAINES Internet-based

vehicle maintenance technical information subscription service in 1998. At the end of 2018 the number of FAINES subscribers had reached 35,146 businesses, an increase of 730 (2.1%) from the previous year.

The average number of times FAINES is used per month has increased every year from approximately 450,000 times in 2011, to about 900,000 times per month at present. FAINES was used by each subscriber business 25 times a month in 2018.

The types of information accessible via FAINES used most often each month are the maintenance manual information, accessed most often at 360,000 times a month, followed by the vehicle maintenance standard work points table, accessed 300,000 times a month, then service data, accessed 90,000 times a month, and finally examples of breakdown repairs and maintenance advice, accessed 70,000 times a month. There is a lot of recorded information for older model-year vehicles that have been used for many years and the number of cases registered as examples of breakdown repairs is growing steadily to form, in conjunction with the maintenance manual information, the most frequently searched core of the FAINES service.

The types of information FAINES provides and the data stored in its system include: (1) maintenance manual information: 1,564 pieces of data, 655 vehicle models (last year: 1,465 and 613, respectively), (2) vehicle maintenance standard work points table: 5,627 pieces of data from the 1995 version to the 2018 version (last year: 5,426), (3) examples of breakdown repairs and maintenance advice: 7,294 pieces of data (last year: 6,889), (4) vehicle data (sampling data) from registered vehicles equipped with OBD, mainly vehicles compatible with J-OBD II: 210 pieces of data (last year: 209), (5) technical information: 1,857 pieces of data (last year: 1,775), and (6) service data: 3,593 pieces of data (last year: 3,373).

In August 2006, JASPA began operating an illegal parking fee delinquent vehicle information inquiry system that allows vehicle maintenance personnel to check whether a vehicle brought in for a shaken vehicle inspection has unpaid illegal parking fees. By the end of 2018, some 35,942 maintenance shops (23,431 full-time vehicle maintenance businesses and vehicle maintenance businesses run as an additional business, as well as 12,511 maintenance shops at vehicle dealers) had registered to use this system, with 1,502,840 queries entered into the system in the same year. This means that over 4,000

queries were entered into the system each day.

3 Inspection and Maintenance System Trends

3.1. Vehicle Inspections

In 2018 the total number of shaken renewal inspections (sum of data from MLIT, the National Agency for Automobile and Land Transport Technology (NALTEC), and the Light Motor Vehicle Inspection Organization (LMVIO)) was 32,761,581 cases, an increase of 275,715 cases (0.9%) compared to 2017. This was the fourth consecutive year that number increased.

The total number of registered vehicles and mini-vehicles specified to receive maintenance was 23,963,601 an increase of 327,507 vehicles (1.4%) compared to 2017. The specified maintenance rate rose by 0.4% from the previous year to 73.2%.

Closer analysis of the data for registered vehicles collected by MLIT and NALTEC shows that the number of registered vehicles subjected to a shaken renewal inspection was 21,035,511, an increase of 429,096 vehicles (2.1%) compared to 2017. The number of vehicles subject to specified maintenance was 15,996,926, an increase of 388,287 vehicles (2.5%). The specified maintenance rate rose by 0.3% from the previous year to 76.0%.

In 2018, the number of inspections conducted by NALTEC at inspection centers throughout Japan to assess compliance with the Japanese Safety Regulations for Road Vehicles (total number of new inspections, shaken renewal inspections, structural change inspections, and re-inspections) was 6,944,274. This was an increase of 178,454 inspections (2.6%) compared to 2017.

The number of on-street inspections was 129,424, a decrease of 1,876 (1.4%) compared to 2017.

The breakdown of the number of the different types of inspections indicates that there were 1,061,144 new inspections (including preliminary inspections), an increase of 21,398 (2.1%) compared to 2017.

The number of shaken renewal inspections was 5,038,585, an increase of 40,809 (0.8%) compared to 2017. This was the first time in 11 years (since 2007) that the number of these inspections had increased.

The number of structural change inspections was 63,858, a decrease of 470 (0.7%) compared to 2017. There were 780,687 re-inspections in 2018, an increase of 116,717 (17.6%) compared to 2017.

Examining the data for mini-vehicle inspections re-

veals that there were 11,718,430 shaken renewal inspections, a decrease of 154,602 (1.3%) compared to 2017. The number of shaken renewal inspections for mini-vehicles first exceeded 10 million in 2010 and, since 2015, has exceeded 11 million for 4 years in a row.

The number of mini-vehicles subject to specified maintenance was 7,966,675 and the specified maintenance rate was 68.0%, an increase of 0.4% from the previous year. The specified maintenance rate for mini-vehicles has risen by approximately 5.7% over the past 10 years.

The number of vehicles brought into LMVIO for a shaken renewal inspection was 3,751,755. This total consisted of 2,675,768 vehicles brought in by maintenance personnel, and 1,075,987 vehicles brought in by the owner.

3.2. OBD Inspections

Current automobile inspections are performed by observing the external appearance and verifying functions using measuring instruments, but they are not able to verify the functions of electronic devices used in driver assistance technologies and autonomous driving technologies. With the rapid adoption of a succession of advanced driver assistance technologies, there is now a clear possibility that an electronic device malfunction may create a situation unintended by the driver with the potential to result in a serious accident. In light of the growing need to confirm the proper functioning of these electronic devices, MLIT established the Study Group to Examine Potential Automobile Inspection Methods that Utilize On-board Diagnostic (OBD) Systems in December 2017.

The purpose of this group is to examine possible methods of performing vehicle inspections that take advantage of OBD systems, which use sensors installed in the vehicle to self-diagnose and record any abnormalities in component parts, as well as consider the introduction of such inspections. The report from this group on this topic was compiled in fiscal 2018 (March 2019).

The conclusions in this report indicated that the group recommends applying a new inspection method to driver assistance devices, autonomous driving functions, and exhaust emissions devices on new passenger vehicles, buses, and trucks certified in 2021 and later. Starting in 2024 (2025 for imported vehicles), this method will result in a failing of the shaken inspection when the scanning tool detects a failure code (a specific diagnostic trouble code (DTC)) recorded in the OBD that does not comply with the specified safety standards.

The automaker-submitted technical information (ECU information) necessary for failure code reading and the failure codes that do not conform to safety standards (specific DTCs) are centrally managed by NALTEC and will be provided to vehicle shaken inspection sites and designated maintenance shops nationwide.

4 Machine Tools

Every year at the end of July, the Japan Automotive Service Equipment Association (JASEA) collects and then announces the automotive machine tool sales figures from its 28 member companies from the previous fiscal year. The latest announced machine tool sales figures are those from fiscal 2017 (from April 2017 to March 2018). The machine tools handled by each member company are broadly classified into 19 item categories, and then added up.

In 2017, total automotive machine tool sales amounted to 106 billion 723.39 million yen, an increase of 649.95 million yen (0.6%) compared to the previous fiscal year. This is the third consecutive year that machine tool sales have increased, as well as the fifth year in a row that these sales have exceeded 100 billion yen.

According to the 2017 survey, 11 of the 19 item categories showed increased sales compared to the previous year. These included car washing equipment (sales of about 9 billion yen), battery and AC service equipment (2.2 billion yen), and general equipment for use in the garage (7.1 billion yen) which all hit their highest levels in the past 10 years. Furthermore, increases in sales were also seen in the following categories: lifts, jacks, and presses, pneumatic and electric tools, body maintenance equipment, engine diagnostic equipment, engine maintenance equipment, environmental maintenance equipment, and others (e.g., construction costs, repair costs, and repair parts costs).

In addition, the shortage of mechanics, lack of younger mechanics to replace them, and the increasing age of the workforce are all factors driving greater demand for tools as vehicle maintenance facilities shift toward tools and equipment that help save labor and compensate for personnel shortages. Increasing capital investment by heavy-duty truck dealers has continued in recent years as construction demand has also grown.

The demand for scanning tools has also increased as more and more vehicles become equipped with a large array of electronic controls and devices. The number of scanning tools sold in fiscal 2017 was 17,332 at an average unit price of 129,311 yen. This was an increase of 43.2% compared to the previous year (fiscal 2016) and the total sales also increased by 20.2% to 2 billion 241.21 million yen.

The sales volume of the diagnostic software installed in the scanning tools was 25,917 units, an increase of 34.3% from the previous year. Total sales revenue also increased by 28.2% to 56.51 million yen.

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