

Environmental Performance



In 2017, 100 years after the birth of its 100% domestically produced trucks, Hino Motors has announced model changes to two of its medium- and heavy-duty trucks. For the heavy-duty Hino Profia, it has been 14 years since a model change has been introduced, and for the medium-duty Hino Ranger, it has been 16 years. Hino Motors considered what it would take to have the customers think, "One day I would like to drive a Hino Profia," or "If I am getting a medium-duty truck, then definitely Hino Ranger is the one for me." With that in mind, Hino Motors has introduced brand new trucks featuring the latest technology to improve cabin comfort, safety, and styling, while, of course, incorporating its core value of environmental performance.

In this report, the Company focuses on the environmental and safety aspects of these new trucks, as well as the other special considerations it made in developing these trucks.

Hino's approach to truck development

Hino Motors wants customers to feel, "I want to drive a Hino truck!" To achieve this, the Company strives to improve the appeal of its trucks in terms of environmental performance, safety, cabin comfort, and more.

The Company believes it is meaningful to make commercial trucks that its customers will continue to want. The Company believes that making trucks that meet customers' satisfaction is a key factor to developing its business.

Hino Motors' motivation in developing its products is driven by envisioning a future in the transportation industry where many stakeholders are living an abundant and happy life thanks to their Hino trucks, which are friendly to people, society, and the environment.

Introduction to environmental technology

These new trucks that Hino Motors developed were designed to meet societal demands such as increasingly stringent emission and fuel economy regulations. As a result, the Hino Motors' trucks are able to meet its customer needs for eco-driving while also contributing to the overall global environment.

(1) Use of environmentally friendly engines

The Hino Profia's 380PS engine is a newly developed 9.0L engine, which the Company downsized from 13.0L. Hino Motors equipped it with two sets of world's first air-cooled intercoolers and a dual-stage turbo system for a dramatic improvement in turbo efficiency. In addition, other technologies including a dimple liner* were added. It reduces frictional resistance for a revolutionary level of fuel economy.

Similarly, across all grades of the Hino Ranger, Hino Motors downsized its 7.0L engine to 5.0L. Then, by leveraging high-torque engine characteristics by applying technologies such as ultra-high pressure fuel injection, dual-stage turbos, dimple liners, and oil temperature/pressure controls, the Company has succeeded in improving fuel economy.

※*Dimple liner : A type of liner with dimples that is used in the cylinder

of the sliding member of the piston to reduce frictional resistance



New A09C engine (Profia)

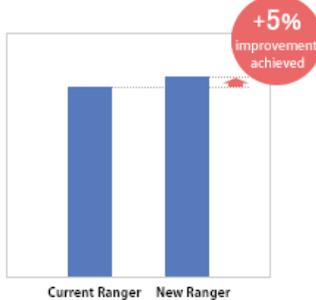


New A05C engine (Ranger)

Improvement in fuel economy
Example: GVW 25 ton class 380PS
(highway transportation application)



Improvement in fuel economy
Example: GVW 14 ton class 260PS
(highway transportation application)

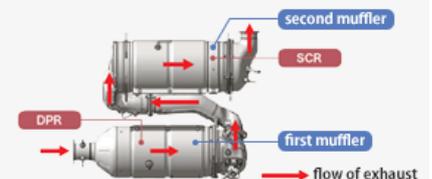


*2015 Heavy Vehicle Fuel Economy Criteria Achievement Level

In addition to improving fuel economy levels, the improvements to the engines and exhaust emission after-treatment devices (DPR: diesel particulate active reduction systems) has made the trucks even cleaner in terms of emission levels, bringing them in compliance with 2016 emission standards. For the Hino Profia, the Company created a version to achieve a 10% improvement of the 2015 fuel economy standard. For the Hino Ranger, Hino Motors expanded the number of versions that achieve a 5% improvement of the same standard.

DPR-II

The Hino Ranger (the 210PS and 190PS engine versions) are urea free, and therefore able to comply with the stricter 2016 emission standards. The first muffler purifies PM and NOx in the low temperature ranges. The second muffler has a newly developed NOx catalyst that is capable of purifying NOx in medium to high temperature ranges. A fuel addition valve is mounted at the rear end of the first muffler. It adds the fuel necessary for the NOx purification reaction in the catalyst of the second muffler.



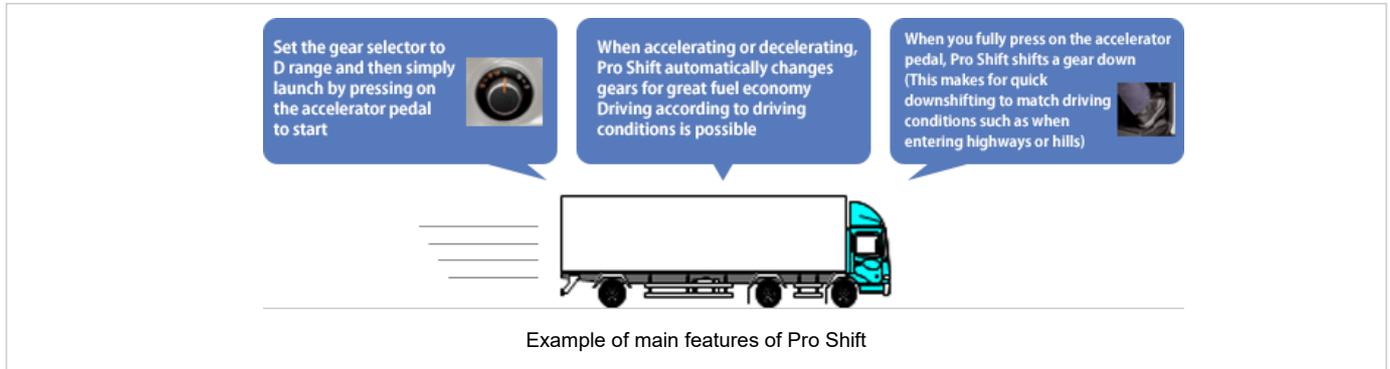
(1) Supporting eco-driving for customers

One of the goals of the new trucks was to make it easy for anyone to achieve eco-driving. As such, Hino Motors made the following eco-driving support tools on these new trucks as a standard equipment.

Pro Shift (mechanical automatic transmission): Support for gear shifting

To achieve eco-driving, it is necessary to keep the engine in the rpm range best suited to each situation by changing gears in a suitable manner.

Pro Shift shifts gears automatically to ensure that the truck stays in the green zone for fuel economy for the corresponding driving condition. This makes it possible for even truck drivers with little experience to drive like good eco-driving professionals.



My Drive Master: Timely confirmations of driving circumstances

If truck drivers can know their driving circumstances in a timely manner, they would be better able to perform eco-driving for longer time. With My Drive Master, drivers can configure settings for such items as engine rpm and idling time to trigger warnings when those settings are exceeded. It helps drivers to expand their eco-driving abilities.



Prompt to upshift based on engine rpm

Prompt to stop idling based on set idling time

Eco Tree Report: Analysis of the driver's eco-driving

The Hino Eco Tree Report includes analysis of truck driver eco-driving efforts in terms of vehicle speed and fuel economy to help them improve their eco-driving capability.

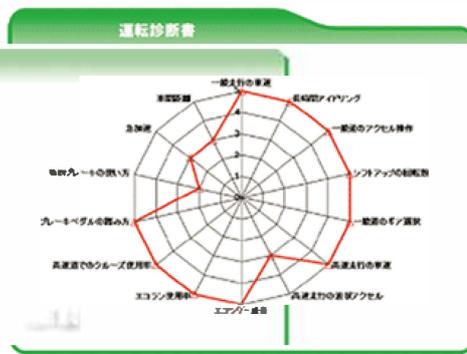
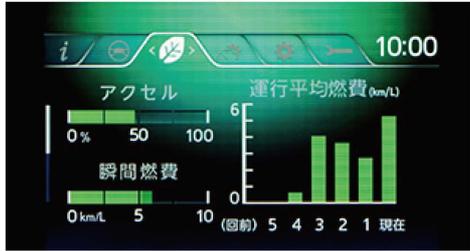
Link: [Eco-driving support](#)

The new Hino Profia and Hino Ranger are equipped with a communication device that collects vehicle operation information by utilizing ICT (information communication technology). This is what makes it possible to provide Eco Tree Reports in a timely manner.

Hino Motors believes that truck drivers can learn to improve on their driving with this kind of feedback that allows them to look back on their driving.



運転の仕方次第で葉が増減します。



運転評価結果				
	2014/6/2 2014/8/22	2014/8/22 2015/7/3	2015/7/3 2016/7/15	前回の 差
総合評価 (100点満点)	86	90	87	-3

総合燃費結果				
	2014/6/2 2014/8/22	2014/8/22 2015/7/3	2015/7/3 2016/7/15	前回の 差
走行燃費 (km/L)	4.3	4.7	5.0	0.3
運行燃費 (km/L)	4.2	4.6	4.8	0.2

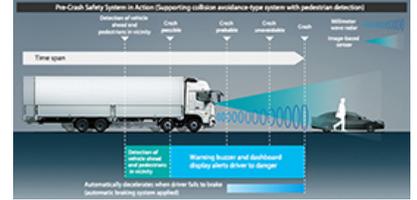
Introduction to safety technology

About half of all truck related traffic accidents involve other vehicles. Next are personal injury accidents involving pedestrians, at about 30 to 40%.

Countermeasures to prevent these kind of traffic accidents are indispensable for commercial vehicle manufacturers. Hino Motors has equipped the new trucks with the following functions to provide another layer for safe and easy driving for its customers.

Improved PCS (pre-crash safety)

Hino Motors has improved the PCS in order to prevent rear-end collisions and personal injury accidents involving pedestrians. The new trucks can now detect stopped vehicles and pedestrians to avoid collisions.



Driver Monitor to prevent accidents due to front-facing carelessness

Many traffic accidents occur every year due to carelessness on the part of truck drivers, such as the failure to properly check surroundings and other forms of inattentiveness. In order to reduce such traffic accidents as much as possible, Hino Motors has equipped the trucks with a Driver Monitor that constantly checks to see if the driver is keeping their eyes open and on the road when traveling at speeds of 60 kph or higher.

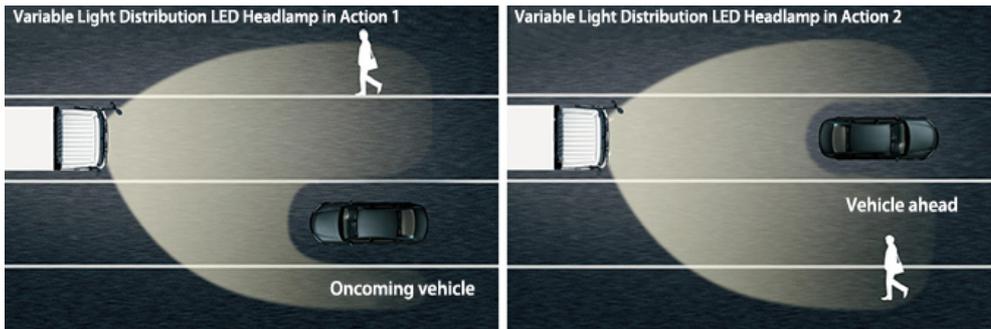
If the Driver Monitor detects that kind of front-facing inattentiveness on the part of the driver, it will sound an alarm to get their eyes back on the road. Further, if there is actually a possibility of a collision at those times, the Driver Monitor will trigger the PCS to prevent a traffic accident.



Variable light distribution LED for night driving support (heavy-duty truck option)

High beams can illuminate more than twice the distance of that of low beams, but using high beams can be dangerous for oncoming vehicles and vehicles traveling in front due to the blinding intensity of light.

In order to prevent blinding oncoming vehicles and vehicles traveling in front, Hino Motors offers a variable light distribution type of LED that automatically controls light distribution when another vehicle is detected. This LED improves your vision at night to avoid close calls and near misses.



Future plans

Trucks are on the road more and for longer distances than typical passenger cars.

With these models changes, Hino Motors has increased the number of standard new functions and new technologies for improved environmental and safety performance.

Hino Motors has focused the development of products to stay one step ahead in supporting customers' driving.

Going forward, the Company will remain committed to contributing to society by working close with its customers to develop products that meet the increasingly tough environmental regulations and traffic accident prevention needs to produce trucks that its customers will continue to want.



We were obsessed with making trucks that truck drivers would want to drive and that support the needs of the transportation companies.

Interviewer: With these model changes, what things did you focus on from the environmental and CSR point of view?

Watanabe Regarding the environment, we focused on meeting

the increasingly tougher exhaust emission regulations for both medium and heavy-duty. To do so, we improved our exhaust emission after-treatment system that we already had on our heavy-duty model to reduce exhaust emissions.

Sato : We also applied DPR-II, a urea-free system that is an after-treatment device that meets 2016 exhaust emission regulations for low-horsepower models. Medium-duty trucks are sometimes used as rental trucks. However, many people do not know that injection of urea is necessary for the after-treatment of exhaust emissions. Therefore, we focused on greatly improving convenience while also meeting exhaust emission regulations by newly developing the DPR-II system to achieve a urea-free solution.

Watanabe : Also, we thought about what we can do for the driver shortage problem, which is a major social issue right now. We thought we could help by making a truck that drivers would really like to drive. To do so we focused on improving cabin comfort in response to the 3Ks of logistics (kitsui, kitanai, kiken or demanding, dirty, dangerous) by improving ride comfort to reduce the burden of driving and adding safety features to lessen the danger. Drivers of heavy-duty trucks in particular have to cover many medium to long-range distances, and therefore often take breaks in their trucks. As such, we tried to improve their cabin experience so they could feel better at home by removing the center console for more space for taking such breaks. We also focused on making the external appearance look cool to gain greater appeal among young, future truck drivers by showing them how trucks can look cool too.

Sato : For medium-duty trucks, our concept was to support the driver by making driving possible through very simple operations. Older drivers, in particular, can get fatigued if they have to worry about this and that while they are driving. However, even for younger drivers, we wanted them to feel that they could drive our truck as easily as passenger car. With that in mind, we focused on increasing automatic transmission models to make it possible to perform launching and stopping with just the two-pedal action of the brake pedal and accelerator pedal. Another thing that we focused on was providing safety devices as standard equipment. Truck accidents have a big impact on society, and even pose a risk to the survival of transportation businesses. In response, we made safety features such as CMBS (collision mitigation braking systems) standard equipment on all of our medium-duty trucks (just like our heavy-duty trucks) to greatly improve the safety of our trucks.

Interviewer: Where were some of the struggles you faced in developing these new models?



Heavy-duty
Truck Chief Engineer,
Product Planning Division
Yoshihiko Watanabe



Medium-duty Truck
Chief Engineer,
Product Planning Division
Naoki Sato



Sato : Since this was the first full-model change for our medium-duty truck in 16 years, many of our associates were completely new to new model development. Also, we had to work with a new plant, our Koga Plant. So, because of these two factors, there were many unfamiliar items we collectively encountered. However, since it is a rare opportunity to have an experience such as this, we worked closely with the whole company and management to ensure that everyone would keep in mind that everything we were working on was, ultimately, for our customers.

Watanabe : For heavy-duty trucks, one of our struggles was that of downsizing our conventional 13 liter engine to 9 liters. We did this for fuel efficiency reasons, but we also needed to ensure that we could still maintain the necessary loading performance. As you might imagine, it was a huge challenge to reduce the engine displacement so dramatically and still achieve the same driving performance of a 13-liter truck. However, thanks to the cooperation of all those involved, we were able to successfully develop a good engine. Our dealer network was skeptical at first, but we worked to persuade them to see what a good engine it was by driving our truck to dealers throughout Japan to have them try it out for themselves.

Interviewer: How do you expect these new models to benefit society?

Sato : We really worked hard on reducing exhaust emissions, so these new models achieve high environmental performance. They also have great cabin comfort to reduce driver fatigue as well as standard safety features for high safety performance. All these things will help drivers drive with a sense of security, which in turn also provides the transportation companies that hire those drivers peace of mind.

Watanabe : Every time I hear or see news of a serious traffic accident somewhere in the world, I feel that if only there had been CMBS (collision mitigation braking system) it might not have been as serious an accident. At Hino Motors, we have been equipping our trucks with CMBS since 2010, and now with these new trucks we have even more standard safety features. I hope that such trucks will become more and more commonplace so that one day everyone will view trucks as safe. That is the kind of society I am looking forward to.