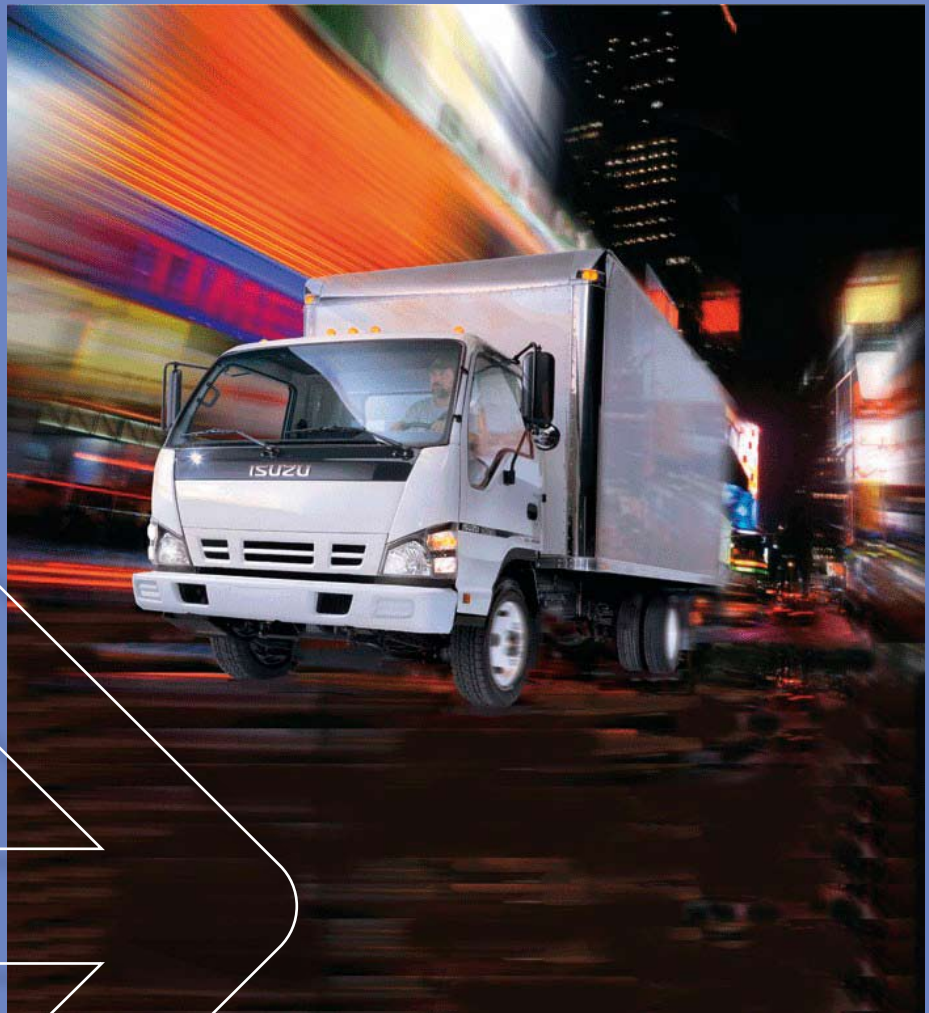


Isuzu Developments

A new approach to development

As a global leader of commercial vehicles, Isuzu has adopted a new approach to truck development. Our new light-duty and medium-duty trucks will have significantly lower development costs due to the use of common components, while our heavy-duty trucks—previously developed separately for each region—will be developed to a basic global standard with add-ons to meet specific regional requirements.



New development method for light-duty and medium-duty trucks reduces costs of global strategic products

In 2006, Isuzu adopted a new, cost-saving approach to new vehicle development. We previously developed light-duty and medium-duty truck models separately, but from now on we are integrating design and development processes for light-duty and medium-duty trucks, advancing shared use of components, and reducing overall development costs by approximately 20%. We have positioned these new trucks as global strategic products, designed for global markets to world standards. The first models developed under this new system are scheduled to go on sale in Japan in late 2006.

Development of basic heavy-duty truck model with add-ons to fulfill regional specifications

We have also reviewed the way we develop heavy-duty trucks. Our traditional approach was to develop a model for the Japanese market, and then develop separate models for each region based on the domestic model. Moving forward, we intend to develop and design basic safety and other features for the most basic model supplied to markets such as Southeast Asia and China, and provide add-ons as required to meet the specifications for other markets like the US, Europe, and Japan. We expect to begin selling heavy-duty trucks developed under this new system in a few years' time.

Leading the way in in-house development

Isuzu has continued to invest in R&D of its core powertrain technologies despite the financial pressures of restructuring, because of the highly sophisticated technological standards required of today's diesel engines for trucks and buses in the context of increasingly stringent environmental regulations. The new long-term exhaust emissions regulations that went into force in October 2005 are said to be the toughest in the world, requiring an 85% reduction in particulate matter (PM) and 40% NOx reduction compared with the previous short-term regulations introduced in 2003. New models and existing models in continuing production cannot be sold unless they satisfy these requirements by September 1, 2007. Improving powertrain performance by the use of sophisticated control technology is essential in order to comply with these standards.

Because of the level of technical sophistication required, most manufacturers opted to outsource development to leading automotive suppliers. But Isuzu decided to develop its own with electronic component company, Transtron Inc., founded as a joint venture with Fujitsu in 1990. Management consensus about the need to make a point of difference in development overrode skepticism about whether the company was capable of the task.

The first model to incorporate Isuzu's own control technology was the light-duty truck ELF KR, which went on sale in 2002. It drove our steep earnings recovery as a best-selling model that complied with the 2003 emissions regulations before they went into force.

Isuzu also developed its own control software capable of precision control of the whole engine, including fuel injection

technology controlled by units of 0.001 second. The technology came into its own in the 4HK1 engine for the FORWARD medium-duty truck, which complied with the new long-term emissions regulations. The new control technology enabled Isuzu to improve engine performance without relying on complex exhaust gas after-treatment technologies like many of our competitors.

Even tougher emissions regulations are on their way. From 2009, emissions regulations for diesel engines will be similar to those for gasoline engines, requiring a 40%–65% reduction in NOx compared with the new long-term regulations and virtually zero PM. Isuzu is tackling this challenge with a three-pronged approach to clean diesel engine technology.

Super-clean diesel technology with I-CAS

The three key technologies for super-clean diesel engines are integrated in the Isuzu Clean Air Solutions (I-CAS) system. I-CAS aims to maximize the advantages of diesel engines—durability, excellent fuel efficiency, and lower CO₂ emissions—while overcoming their disadvantages by integrating optimal combustion technology, after-treatment technology, and comprehensive electronic control. By optimizing these three key technologies, I-CAS reduces exhaust gases, lowers CO₂ emissions, and boosts performance.

Isuzu's optimal combustion technology consists of an intercooler for turbo and fuel injection technologies that achieves ultra-high-pressure fuel injection to control and optimize the injection pressure, timing, and amount. After-treatment technology further cleans exhaust expelled by the engine using a catalytic agent. Isuzu developed an oxidizing catalytic converter and Diesel Particulate Defuser (DPD) to cut PM emissions, and is working on research and development of the Urea-Selective Catalytic Reduction catalyst and NOx catalyzing technologies to reduce NOx emissions. Our electronic control software precisely controls these two technologies with the use of an engine sensor and feedback control technologies.

Having developed our own electronic control technology, Isuzu today leads the industry in electronic control software that maximizes the capabilities of diesel engines. One of the technologies critical to the development of super-clean diesel engines is homogenous combustion, which relies on precise control of the electronic common-rail fuel injection system. Isuzu is one of the Japanese diesel engine manufacturers excelling in this technology, which eliminates PM and NOx in diesel emissions.

Development of DPD

The Diesel Particulate Defuser (DPD) is an after-treatment system that uses a ceramic filter to collect and burn the particulate matter in exhaust emissions. The DPD burns PM efficiently and cleans exhaust emissions by employing common rail fuel injection with multistage injection control, and an exhaust throttle in addition to Isuzu's unique exhaust temperature control. This fuel injection control system achieves optimal combustion treatment by optimal fuel injection pressure, timing, quantity, and frequency with automatic control.