



Freightliner's SuperTruck II previews the next level of freight efficiency

PORTLAND, Ore. – (Feb. 1, 2023) – Daimler Truck North America LLC (DTNA) and its market-leading brand, Freightliner, today debuted the SuperTruck II showcasing innovative features that are poised to deliver the next level of freight efficiency.

As part of the SuperTruck program co-funded by the Department of Energy (DOE) with the aim to reduce emissions from on-road freight transportation, DTNA engineers were able to investigate next-generation technologies for heavy-duty commercial trucks and to clear the technical pathway for their development and potential integration into series production. Focus was on developing new technologies on the most promising core components and systems to improve the real world operational efficiency of the truck to help make customers more successful and increase fleets' operation efficiency.

Enhanced tractor aerodynamics, low-rolling resistance tires, powertrain improvements and energy management with advanced technologies were identified as areas for technology innovations that could potentially enter production for customers in the future.

"Our decision to focus on improvements to core truck components was based on the objective to maximize freight efficiency for our customers while helping to reduce the carbon footprint of trucks and engines," said Rainer Mueller-Finkeldei, senior vice president of engineering and technology, DTNA. "Taken all together, the combined innovations developed for the Freightliner SuperTruck II have provided us the opportunity to explore the technologies needed to meet stringent and forthcoming Greenhouse Gas reduction requirements in the coming years."

Building on the success of SuperTruck I, which overachieved DOE requirements in 2015, SuperTruck II surpassed expectations in aerodynamics, tires, powertrain and energy management, while doubling the freight efficiency of the base vehicle from the start of the SuperTruck program.

Most aerodynamic truck Freightliner has ever built

In close collaboration between the design and engineering departments, the teams were able to overachieve in aerodynamic improvements and reduce the aerodynamic drag of SuperTruck II by more than 12 percent over SuperTruck I.

Instead of radically changing the structure of the truck, the design goal for SuperTruck II was to redefine the existing shape of the market-leading Cascadia to maximize aerodynamic efficiency and simultaneously employ advanced design language to convey that efficiency.

"We wanted to create a shape that makes efficiency exciting," said Jeff Cotner, chief designer at DTNA. "The designers imagined the surfaces of the truck being carved away by the wind. Nature



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has a way of creating the perfect sculptural shape, when the material is light and airy like snow or sand. This was our inspiration in creating the new expressive form language for the Freightliner brand.” Cotner added: “Sometimes what the eye sees is not what the air sees. We let the areas most critical to aero performance design themselves and integrated the more expressive lines in the places where the drag is neutral. Our goal was to gain as much freight efficiency as possible and create a beautiful looking truck at the same time. It was important to us that we didn’t change something just for the sake of changing it.”

The redesigned hood, bumper and chassis fairing all work well with the existing cab structure and now allow the air to flow undisturbed around the truck. The grille, air intakes and doors were redesigned to be as seamless and clean as possible; no sharp edges compromise the aerodynamics or beauty of the truck. Other critical areas were refined in an iterative approach between the design studio and engineering team. Active side extenders and a roof spoiler system closes the trailer gap by up to 4 inches at highway speeds and an enhanced Aerodynamic Height Control lowers the truck just inches off the ground for additional aerodynamic improvements.

Thanks to federal exemption by the National Highway Traffic Safety Administration (NHTSA) for the program, by removing the exterior mirrors and integrating a mirrorless camera system the aerodynamic drag of SuperTruck II was significantly reduced. The cameras have been tested under all weather conditions and have shown great promise in enhancing the driver’s visibility and improved vehicle safety, which supports advocacy for future regulatory changes that would permit the widespread adoption of this advanced technology by manufacturers.

Most efficient powertrain Freightliner has ever integrated

SuperTruck II features the most efficient powertrain Freightliner has integrated into a truck. The highly efficient powertrain enables a 5.7 percent fuel consumption reduction over SuperTruck I. With a non-certified prototype Detroit 13-liter engine featuring two-stage turbo and interstage cooling and a 13-speed overdrive transmission, the powertrain is able to achieve lower downspeeding and greater fuel savings through reduced drag overdrive.

One key powertrain feature of SuperTruck II is split cooling. This system consists of high-temperature and low temperature cooling circuits, working in tandem with two-stage turbocharging and Exhaust Gas Recirculation (EGR) cooling on the engine. Together, these technologies result in further efficiency gains enabling more aggressive downspeeding.

A smart engine lubrication circuit minimizes internal pumping losses, thus reducing engine parasitics by actively proportioning flow to the most sensitive components.



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With adaptive tandem axles another innovation helps increasing fuel efficiency. It allows increased torque from the fuel-efficient powertrains and automatically shifts from 6x4 to 6x2 at highway speeds which benefits the driver when maneuvering in low speed.

Lowest tire rolling resistance DTNA has ever tested

DTNA again collaborated with SuperTruck I partner Michelin on the development of brand new tires specifically designed for adaptive tandem axles to not only reduce vehicle energy consumption but also to reduce maintenance downtime due to minimized wear and tear on the tires. Tires play a critical role to achieving that goal. By lowering the friction on the road, less fuel is needed to maintain the truck speed. The engineers were able to significantly reduce the tractor rolling resistance by 12 percent over SuperTruck I.

In co-development with DTNA, Michelin designed tires specifically for the steer, drive and tag axles of SuperTruck II. The introduction of dynamic load shift further increases efficiency and fuel savings. With this technology, some of the load will be shifted automatically from the drive axle to the tag axle to take advantage of the tag tire low rolling resistance. The overall design of the new tires included development of new treads and compounds that translated into more than 20 percent improvements in drive tire wear and tear and overall significantly improved rolling resistance.

Intelligent energy management that benefits the driver

SuperTruck II features an innovative 48-volt electrical system with lithium-ion batteries, enabling a new electric steering system to adjust demand as needed, whether the operator is maneuvering at low speed or driving at highway speeds, or to operate during EcoSail while the engine is off.

The intelligent EcoSail feature can turn the engine off when drive power is not needed, without requiring any intervention from the driver. At the same time, if the truck is coasting down a hill while the engine is off, features like air conditioning remain in operation. As soon as power is needed, the engine will restart automatically for a seamless experience for the driver.

More 48-volt features result in decreased fuel consumption and increased driver comfort like a new electric air conditioning system that consumes 50 percent less energy than SuperTruck I and continues seamless operations while the engine is turned off.

A new 48-volt starter turns on the engine with more power and speed. Finally, the new 48-volt electrical system operates the hoteling features without the engine running while delivering 12-volt power for the standard cab items like lighting or the instrument cluster.



The drive to innovate continues

Freightliner, an industry-leading brand in North America, has been well recognized for its innovative technologies and efficient trucks since its beginning in 1942. A number of innovative features from DTNA's first SuperTruck are available today in the Freightliner Cascadia, including enhanced aerodynamics, improved engine thermal efficiency and powertrain integration technologies such as downspeeding, and predictive powertrain controls.

DTNA has also been awarded a grant for SuperTruck III to develop a hydrogen fuel cell electric tractor that exceeds heavy-duty long-haul sleeper performance, efficiency, and range requirements without compromising payload. SuperTruck III designs are planned to be revealed by 2027. DTNA's continued involvement in the SuperTruck program aligns with its relentless pursuit of improved customer and driver experiences, as well as increased freight efficiency and resource conservation.

Thanks to our partners:

Michelin – low rolling resistant tires

Stoneridge, Inc. – camera monitoring system provider

National Renewable Energy Laboratory - 48V battery thermal management

Oak Ridge National Lab - combustion and core engine research

University of Michigan - predictive engine controls

Clemson University - Thermal Barrier Coating development

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About Freightliner Trucks

Freightliner Trucks is a division of Daimler Truck North America (DTNA) LLC, headquartered in Portland, Oregon. With 80 years of experience, Freightliner produces and markets medium-duty and heavy-duty trucks as the leading heavy-duty truck brand in North America. DTNA is a subsidiary of Daimler Truck Holding AG (DTG), one of the world's leading commercial vehicle manufacturers. More information is available at www.Freightliner.com.

About Daimler Truck North America

Daimler Truck North America LLC, headquartered in Portland, Oregon, is a leading provider of comprehensive products and technologies for the commercial transportation industry. Daimler Truck North America designs, engineers, manufactures and markets medium- and heavy-duty trucks, school buses, vehicle chassis and their associated technologies and components under the Freightliner, Western Star, Thomas Built Buses, Freightliner Custom Chassis Corp and Detroit brands. Daimler Truck North America is a subsidiary of Daimler Truck Holding AG (DTG), one of the world's leading commercial vehicle manufacturers.