Mercedes-Benz Aerodynamic Truck and Aerodynamic Trailer 2012 and Future Truck 2025

Peter Lobner, 2 April 2020

Aerodynamic Truck and Aerodynamic Trailer

The aero-optimized Actros tractor and the new Aerodynamic Trailer were products of a Mercedes-Benz initiative known as “Truck and Trailer 7plus”, which aimed to develop an EU tractor-trailer that had a fuel efficiency more than 7% higher than its predecessor. Development partners for the Aerodynamic Trailer were Daimler Trucks and trailer specialist Schmitz Cargobull. Mercedes-Benz introduced the aero-optimized Actros tractor and Aerodynamic Trailer at the 2012 IAA Commercial Vehicles Show.

The tractor unit was a current production model Mercedes-Benz Actros with a StreamSpace cab. The base model tractor was aerodynamically optimized and fitted with an optional Mercedes-Benz heavy truck aero package consisting of:

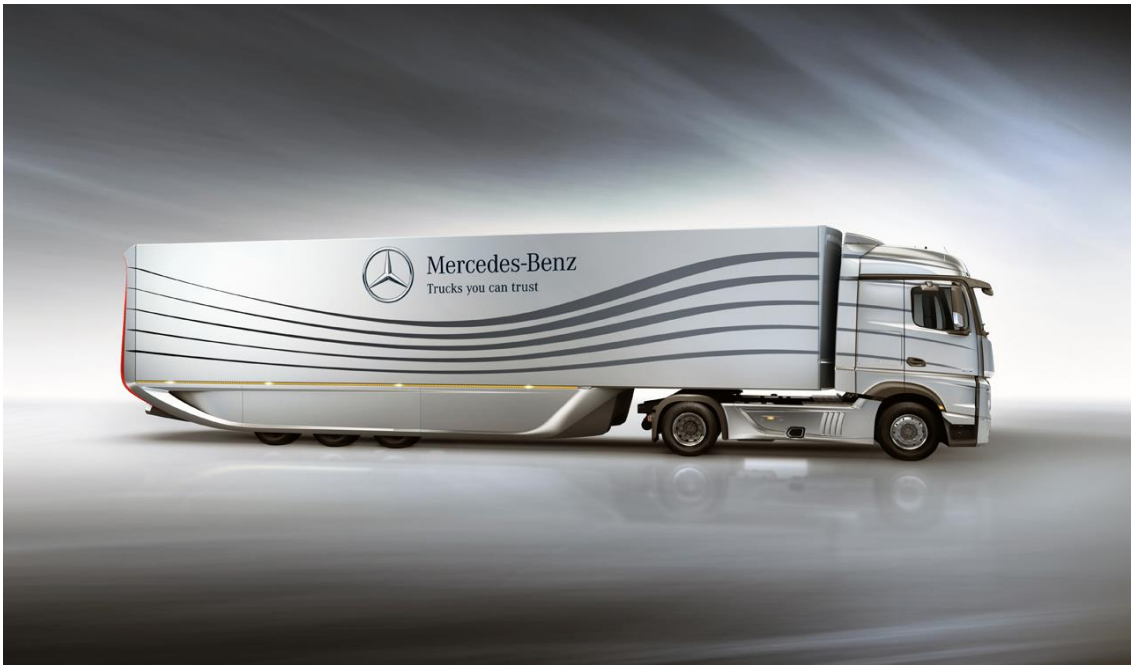
- Air deflector on the roof of the cab smooths airflow to the trailer.
- Cab front edge deflectors smooth airflow transition to the sides.
- Side trim panels between the axles smooth airflow in the region around the tractor wheels.

The 40 tonne (88,185 pound) Aerodynamic Trailer has a European standard size cargo box with aerodynamic refinements to help reduce drag. The trailer is optimized with the following features:

- A spoiler on the front bulkhead of the trailer reduces the distance to the tractor unit and lowers aero drag by 1%.
- Side panels along the bottom of the trailer reduce aero drag by 8%. They are slightly drawn-in at the front and characterized by an opening at the rear. This steers the air in the direction of the rear diffusers.
- The diffusers at the rear bottom corners of the trailer have the shape of a parallelogram and link up with the underbody paneling. This reduces aero drag by 1–2%.

- Rear-end tapered aerodynamic extensions of the sides and top of the trailer form a crucial part of the trailer's aerodynamic design by streamlining the airflow at the back of the trailer and reducing aero drag by a further 7%. These hinged aerodynamic extensions increase the overall length of the tractor-trailer by slightly more than 40 cm (15.7 inches). To facilitate access to the cargo, electric actuators automatically fold the side extensions onto the rear door panels when the vehicle is stopped. The top airfoil automatically swings about ten degrees upwards during loading and unloading, providing clearance for the doors of the loading portal.

Mercedes-Benz says this combination of trailer modifications reduced overall aerodynamic drag by 18%.



Mercedes-Benz Actros tractor and Aerodynamic Trailer, circa 2012. Source: Mercedes-Benz

As reported in September 2012 by Green Car Congress, "Real-world, on-road testing conducted by Mercedes-Benz showed that a tractor/semitrailer combination with a gross weight of 40 tonnes consisting of a Mercedes-Benz Actros—currently offering the best aerodynamics in a series production truck—and the aerodynamically optimized Aerodynamic Trailer can achieve fuel savings of 4.5% in long-haul usage."

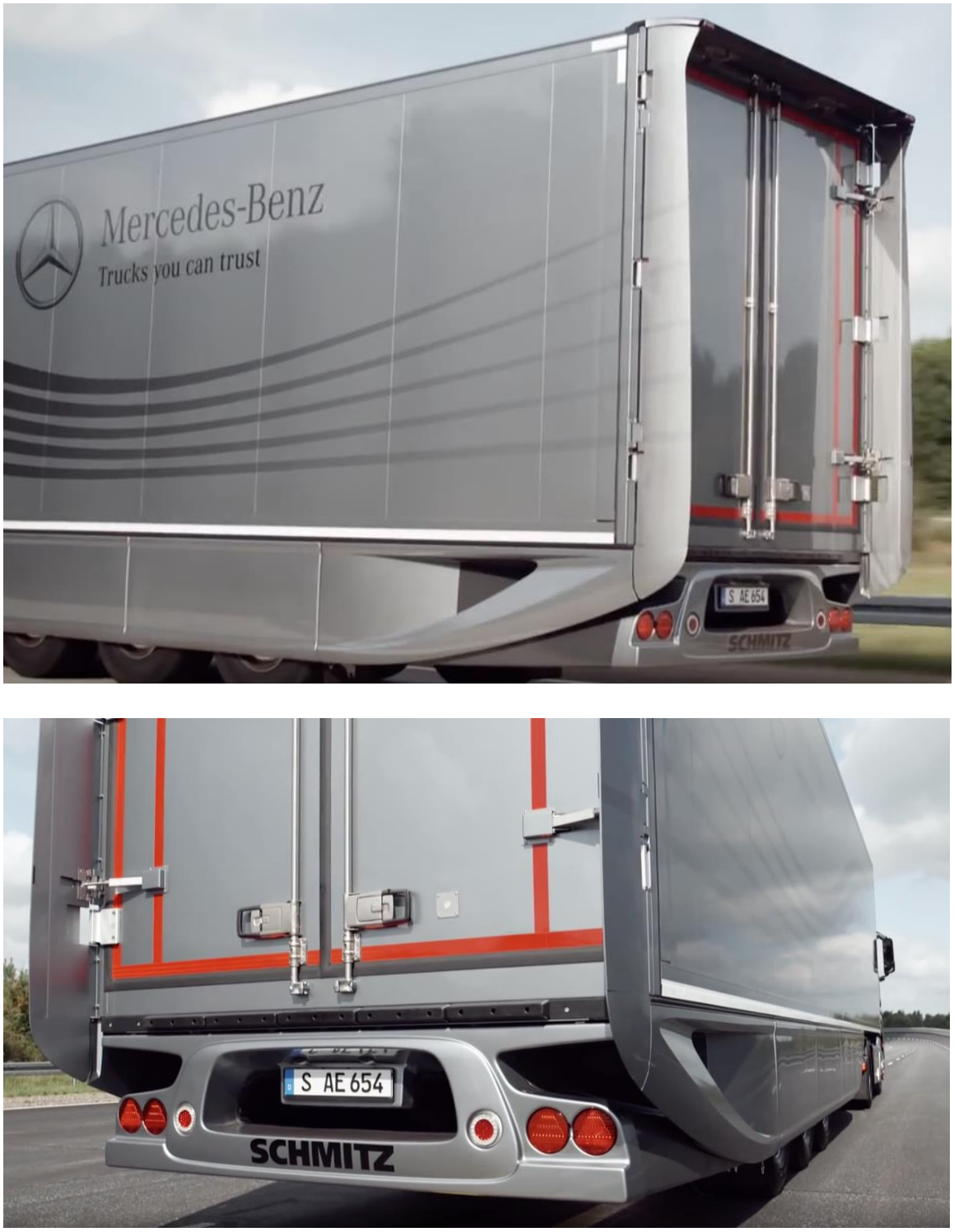
Unfortunately, the Aero trailer isn't street legal because it is longer than the limit prescribed in EU Directive 96/53/EU (same issue with the MAN Concept S tractor-trailer). Tim Maly, writing for Fastcompany.com, explained the trailer length issue:

> "The issue is that part of the design of the trailer includes a tapered extension to the tail end that runs a foot and a half past the maximum allowable trailer length in Europe. Mercedes-Benz says that this taper accounts for a third of the improvement in efficiency and they are confident that a change to the laws is possible. Why not just make the trailer 18 inches shorter? Mercedes-Benz's press release holds a clue:
>
> > 'The fundamental feature of the revolutionary Aero Trailer is to be found in the trailer's load compartment, whose dimensions remain totally unaffected,……..The familiar box – measuring 13.6 m in length, 2.55 m in width and with an overall height of 4.0 m – remains available for the freight, just as before.'
>
> The tractor trailer is merely one component in a much larger and highly standardized logistics network."

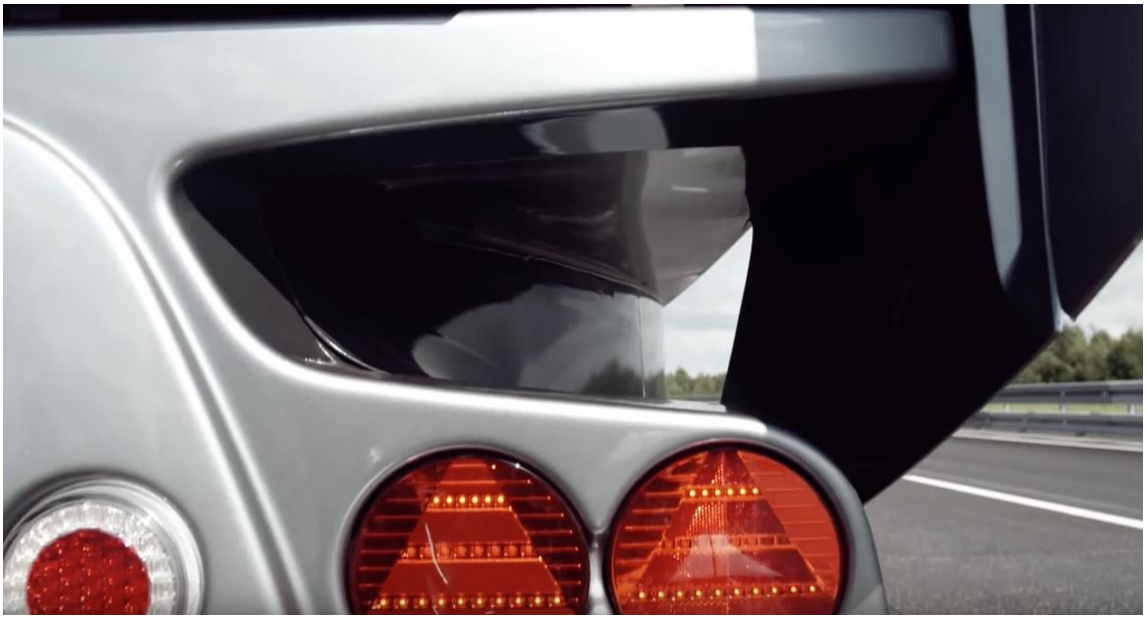
Mercedes-Benz Actros tractor and Aerodynamic Trailer, circa 2012. Source: Mercedes-Benz

Mercedes-Benz Actros tractor and Aerodynamic Trailer, circa 2012. Source: Mercedes-Benz

Mercedes-Benz Actros tractor and Aerodynamic Trailer on a test track. Source: Screenshot from Daimler AG video, 2013



Details of the trailer side panels, rear diffuser and tapered, hinged fairing that extended the total vehicle length beyond *the EU limit. Source: Screenshot from Daimler AG video, 2013*



Details of the trailer rear diffuser.
Source: Screenshot from Daimler AG video, 2013

More information on the Aerodynamic Trailer is available in the following articles:

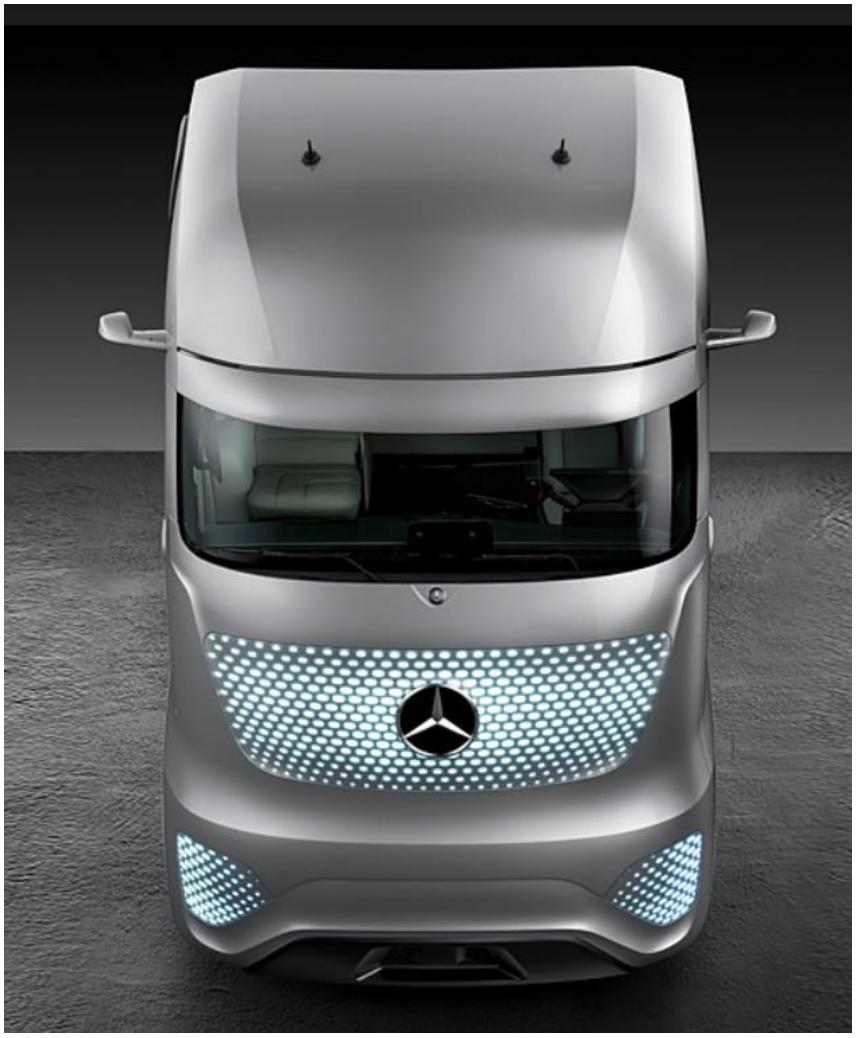
- "Aero Trailer Design Study from Mercedes-Benz Shows 18% Lower Wind Resistance, Almost 5% Reduction in Fuel Consumption," Greencarcongress.com, 25 November 2011: https://www.greencarcongress.com/2011/11/aero-20111125.html
- "Mercedes-Benz Aerodynamic Trailer Cuts Air Resistance 18%, fuel consumption between 4 - 5%; New Aerodynamic Truck Rig," Greencongress.com, 18 September 2012: https://www.greencarcongress.com/2012/09/mbaero-2010918.html
- Tim Maly, "Mercedes Invents An Utra-Green Tractor Trailer," Fastcompany.com, 12 December 2011: https://www.fastcompany.com/1665605/mercedes-invents-an-ultra-green-tractor-trailer

You can view a short 2012 YouTube video on a similar Mercedes aero tractor-trailer at the following link:

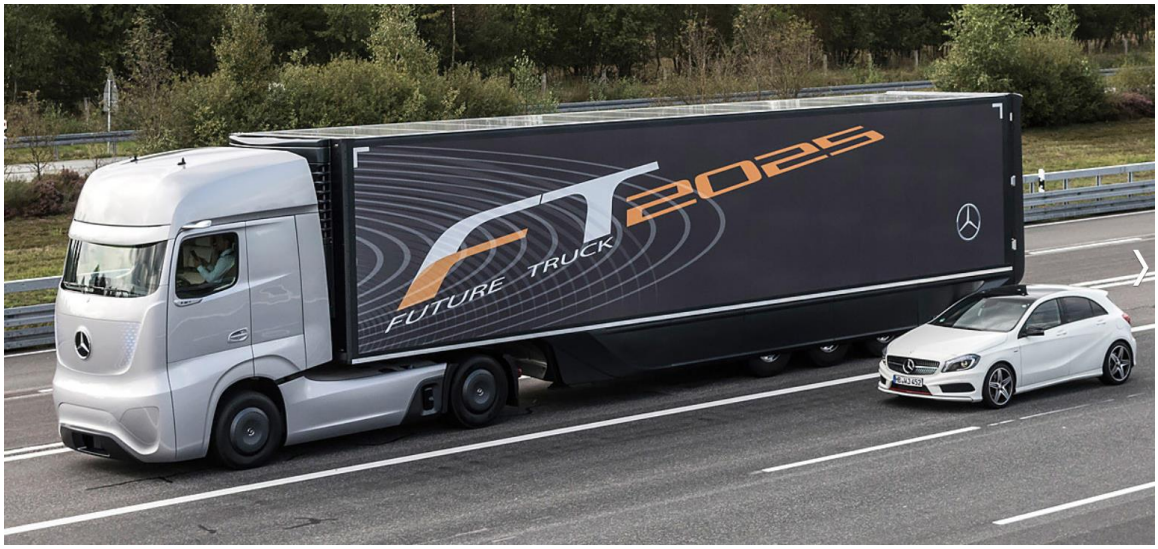
- "Mercedes-Benz Aerodynamics Truck & Trailer" (5:33 minutes), Daimler AG, 2013: https://www.youtube.com/watch?v=J7BGQ3ZuK0Q

Future Truck 2025

Mercedes-Benz currently is focusing their advanced long-haul truck development on the Future Truck 2025, which is designed for autonomous operation. This tractor incorporates a refined aerodynamic design.

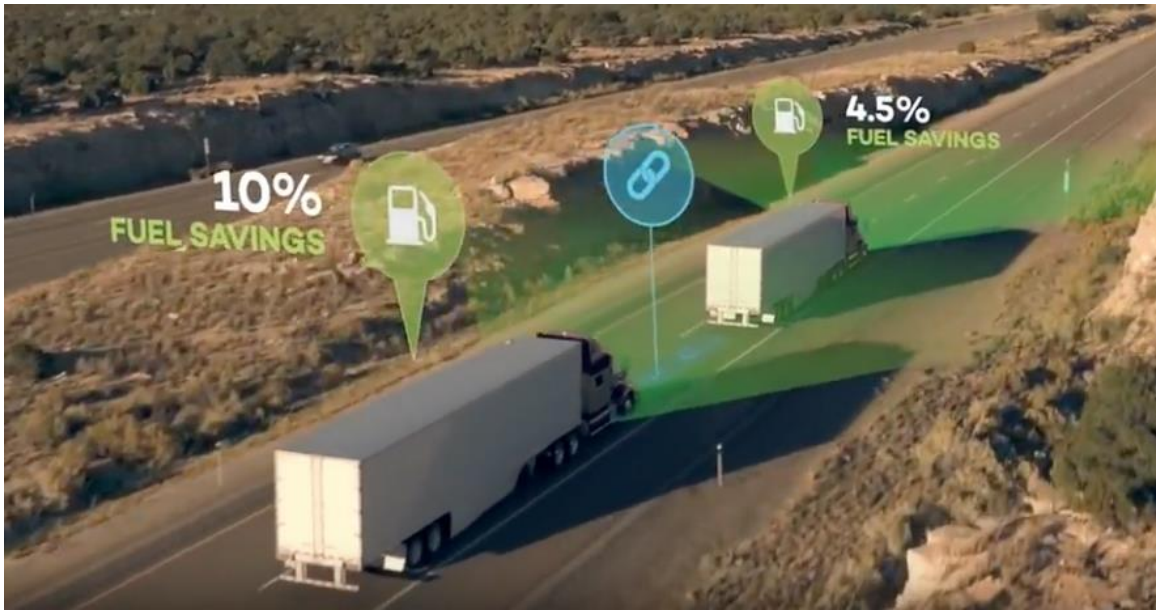


Mercedes-Benz Future Truck 2025.
Source: Mercedes-Benz



Mercedes-Benz Future Truck 2025 tractor hauling a conventional trailer. Source, both graphics: RoadStars

The car-to-car (C2C) communications and automation features of the Future Truck 2025 are expected to enable “platooning,” which involves suitably equipped trucks locating each other on the highway and then forming a closely-spaced convoy that results in substantial drag reduction and fuel savings for all members of the convoy.



Fuel savings from platooning.
Source: Screenshot from Mercedes-Benz video, below.

You'll find descriptions of the Mercedes-Benz Future Truck 2025 at the following links:

- "The long-haul truck of the future," on the Mercedes-Benz website here:: https://www.mercedes-benz.com/en/innovation/autonomous/the-long-haul-truck-of-the-future/
- "Future Truck 2025," on the RoadStars website: https://roadstars.mercedes-benz.com/en_GB/events/2014/july/future-truck-2025.html

Also see the following video:

- "Mercedes-Benz Future Truck 2025" (7:37 minute), 2014: https://www.youtube.com/watch?v=Onk39Z-UrEc