

Walmart Advanced Vehicle Experience (WAVE) demonstration tractor-trailer

Peter Lobner, 2 April 2020

In March 2014, Walmart showcased its futuristic hybrid-electric tractor-trailer at the Mid-America Trucking Show (MATS) in Louisville, KY. Walmart developed this demonstration vehicle in collaboration Peterbilt Motors, Roush Engineering, Great Dane Trailers, Capstone Turbine Corp. and other firms. Roush Engineering was responsible for the vehicle's construction.

Walmart reported that the design team used extensive computational fluid dynamics (CFD) analysis to optimize the truck's styling. The truck's shape represented a 20% reduction in aerodynamic drag over Walmart's current Peterbilt Model 386." (Note: The Model 386 was in production from 1981 to 2005 and is not a particularly aerodynamic design). Walmart estimated that this aerodynamic improvement translated directly to a 10% gain in fuel economy. The new truck made extensive use of carbon fiber structures for lighter weight.

Walmart Advanced Vehicle Experience Concept Truck

- Prototype advanced turbine powered, range-extending series hybrid powertrain, which includes a range-extending turbine, a battery storage system and an electric motor
- A trailer made almost exclusively with carbon fiber, saving around 4,000 pounds
- Centered driver's seat
- Electronic dashboard with customizable gauges and performance data
- Comfortable full-size sleeper
- Sliding driver's door
- Convex trailer nose adds to aerodynamics and increases storage space inside the trailer

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The image is a presentation slide for the Walmart Advanced Vehicle Experience Concept Truck. It features a large central image of the truck and two smaller inset images. The central image shows the truck from a side profile, with yellow arrows pointing to the convex trailer nose and the carbon fiber trailer. The top-right inset shows the front view of the truck, highlighting the centered driver's seat and the electronic dashboard. The bottom-right inset shows the driver's side of the truck, highlighting the comfortable full-size sleeper and the sliding driver's door. The slide includes a list of key features and a call to action to follow Walmart on Twitter.

WAVE tractor-trailer, circa 2014. Source: Walmart



WAVE tractor-trailer, circa 2014. Source: Walmart



*Two digital model views of the WAVE tractor-trailer.
Source: <https://www.cgstudio.com/3d-model/walmart-truck-43551>*



Digital model view of the WAVE tractor-trailer.

Source: <https://www.cgstudio.com/3d-model/walmart-truck-43551>



View from the cab. Note the center-mounted driver's seat flanked by digital displays. Source: Walmart

The WAVE tractor has a hybrid electric powertrain with a Range Extender C65 micro-turbine generator from Capstone Turbine. The micro-turbine operates at a constant, optimum 96,000 revolutions per minute (rpm), with its rotating components supported by air bearings. The micro-turbine drives a generator that supplies the energy storage system batteries, which deliver on-demand electric power to the electric motor-driven power train. For use in urban areas, the truck will run on electric power alone until the battery state of charge hits 50%. At that time the micro-turbine will automatically start and begin charging the batteries. For maximum range, the micro-turbine will operate continuously. The Capstone micro-turbine is air-cooled and can operate with various types of fuel.

In 2015, the Los Angeles Times reported, “Great Dane Trailers of Fontana, Fiber-Tech Industries Inc. of Michigan and Milliken & Co. of South Carolina combined to build the 53-foot-long carbon-fiber trailer held together by advanced adhesives and reduced the weight to just 10,000 pounds, compared with 14,000 pounds for a typical trailer.”

WAVE was not developed beyond the road-ready prototype stage.



The WAVE tractor with sliding door. Source: Walmart via INSIDEEVs

You'll find more information on the WAVE tractor-trailer here:

- “Walmart Advanced Vehicle Experience Showcases Cutting Edge Innovations,” on the Walmart website here: <https://corporate.walmart.com/newsroom/2014/03/26/walmart-debuts-futuristic-truck>
- Mark Kane, “Walmart WAVE Truck – Full Details (w/video),” INSIDEEVs, 1 April 2014: <https://insideevs.com/news/321421/walmart-wave-truck-full-details-w-video/>
- Ronald White, “Wal-Mart test truck aims to slash fuel consumption on big rigs,” Los Angeles Times, 19 September 2015: <https://www.latimes.com/business/la-fi-walmart-truck-20150920-story.html>
- Brian Straight, “Riding the WAVE to fuel-saving heaven,” FleetOwner.com, 28 September 2015: <https://www.fleetowner.com/running-green/fuel/article/21694849/riding-the-wave-to-fuelsaving-heaven>

Also see these short YouTube videos:

- “Walmart Advanced Vehicle Experience Concept Truck” (6:02 minutes), Walmart, 2014: https://www.youtube.com/watch?v=NER9X4_gtYk
- “Introducing the Walmart Advanced Vehicle Experience concept truck” (0.59 minutes), Walmart, 2014: <https://www.youtube.com/watch?v=iTTgxqZqTaA>