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 with 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.

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.  
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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:


- 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/


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=iTTqxqZqTaA