

Breaking Energy

EMISSIONS, FUEL, TECHNOLOGY

Wrightspeed Hybrid-Electric Trucks are the Cutting Edge of Truck Design

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Wrightspeed Powertrains of San Jose, California is a pioneer in developing hybrid-electric powertrains for heavy duty trucks. This next-generation design provides superior power, performance, fuel efficiency, and the lowest emissions for heavy duty trucks that operate in some of the most challenging and fuel-guzzling applications.

There are many advantages to hybrid-electric vehicles that are beginning to be appreciated by the auto industry and Wrightspeed is at the cutting edge of this new engineering paradigm. Wrightspeed builds powertrain retrofits for existing trucks that replace the engine, transmission and driveshaft with electric motors, plug-in batteries, regenerative braking, and a turbine generator. The performance offered is unparalleled in conventional trucks, with direct traction control at drivewheels, constant horsepower for heavy torque demand, slip limiting technology, and the emissions eclipse the strictest air quality mandates.



Credit: Wrightspeed

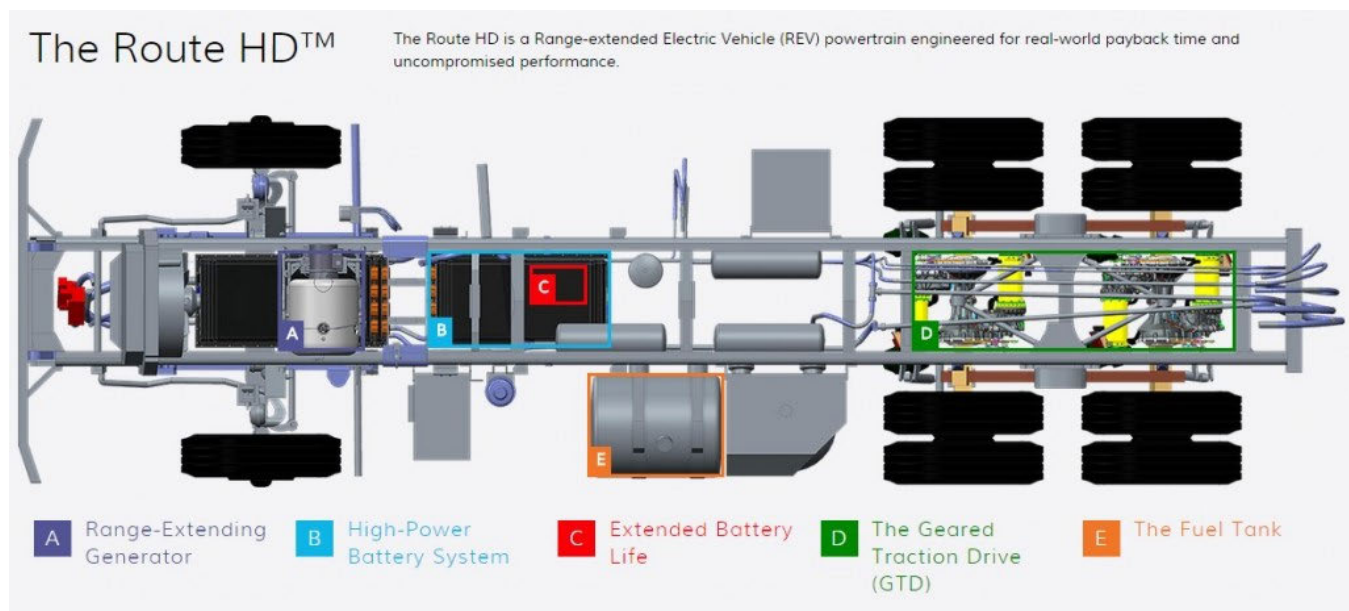
In the Wrightspeed powertrain, multiple electric motors are powered by a battery bank which is charged from either a plug when parked, a range extending turbine generator, or the regenerative braking. Depending on the driving style, impressive gains in fuel economy can be seen. Driving patterns that involve a lot of stops and starts, such as garbage trucks and delivery vans that normally have very low fuel economy, can generate significant amounts of power from the regen brakes while also saving wear and tear on brake pads.

For example, the Isuzu NPR, a common delivery truck averages 12 mpg with traditional diesel engine when driving around a city. The same truck retrofitted with the Wrightspeed system was measured at 44 mpg, similar to a Toyota Camry Hybrid's highway EPA figure, and a 300-percent improvement.

The Capstone microturbine generator is very clean, efficient, and quiet. It is only used to charge the batteries and is operated at its peak performance rate at all times allowing it to be very fuel efficient. Normal engines will range from low rpm idling to high speed at other times which creates inefficiencies in fuel use and bad emissions. The microturbine can operate on multiple fuels, mainly diesel or natural gas, and has much cleaner emissions than comparable piston engines without needing any exhaust aftertreatment. The turbine has only one moving part and needs no lubrication or cooling and is low maintenance.

Wrightspeed was founded by Ian Wright in 2011. Wright was one of the original co-founders of Tesla Motors but he left to pursue his own design vision. Back in 2005 Wright built the X1 concept electric car, which is still the fastest street legal electric car in the world that delivers 0-60 mph in 2.9 seconds and 170 mpg equivalent (watch [this video](#) to see the X1 beat a NASCAR racer and a Lamborghini head to head).

Wrightspeed is only manufacturing powertrains for truck retrofits, and staying away from manufacturing entire vehicles. The company has three products: the Route™, a Range-extended Electric Vehicle (REV) powertrain retrofit for Class 3-6 trucks; the Route HD™, a heavy duty REV powertrain for Class 7-8 trucks; and the Circuit™, with four electric motors for supercars. [Watch](#) Ian Wright drive one of his trucks through the Bonneville Salt Flats.



Credit: Wrightspeed

Wrightspeed's main markets now are delivery trucks and garbage trucks. These trucks that have a lot of stops and starts and high fuel consumption offer a very compelling economic case for electrification. Where an average family car might only burn 600 gallons of fuel a year, a garbage truck can consume 14,000 gallons a year. A typical garbage truck might travel 130 miles a day with a

thousand hard stops at 2.8 miles per gallon of fuel. A Wrightspeed retrofit for the heavy duty platform costs around \$200,000 but can save \$35,000 per year in fuel and \$20,000 in maintenance (much of that in brakes) which means 4-5 years to pay off the investment.

Wrightspeed has a backlog of orders and recently announced they are moving to a new factory that will allow them to expand. Wrightspeed holds most of the IP for its powertrains, including patent-pending controls, inverter, electric motor, two speed gear box with clutch-less shifting, battery pack, battery management system, and LCD user interface.

Among the inventions Wrightspeed has created is a clutchless gear shifting mechanism called Geared Traction Drive which uses sophisticated computer controls to synchronize high speed gear shifting. Their proprietary motor weighs only 70 pounds and delivers 250 horsepower, among the best power to weight ratios found in any motor. Wrightspeed also uses very strong regenerative braking that can completely stop a truck on an incline and delivers 730kw of power back to the batteries. The lithium iron phosphate batteries are provided by A123 Batteries.

Wright's design philosophy is to have the truck drive like a normal truck with no training needed for the driver. The only difference the driver should see is that the truck is quieter, less smelly, and the driver uses brake pedal less.

Ian Wright said, "We have had very good responses from the market. We do not see a lot of competition, we have the only range extended EV power train for medium and heavy duty trucks, we have the only repower kits you can buy, and the only turbine range extender. It's pretty lonely out here which is great."

Topics: Battery Technology, Electric Vehicles, Emissions, Emissions Reduction, Fuel Efficiency, Fuel Efficient Vehicles, Heavy Duty Trucks, Tesla
