

SUMMARIZING TECHNOLOGY ON THE TRUCK



Shell has partnered with the Airflow Truck Company to collaborate on a hyper-aerodynamic, super fuel-efficient class 8 concept truck: Starship. By bringing together the best of today's existing and custom technologies, we aim to find out just how energy efficient goods transport by road can be – today – and elevate the conversation about the energy transition.



HOW IS STARSHIP PUSHING THE LIMITS ON EFFICIENCY

Aerodynamics

- **Cab** is a bespoke hyper-aerodynamic design, fabricated of 100% carbon fiber.
- **Active grill shutters** (active based on temperature to maximize aerodynamics and maximize efficiency) when open, enable air to flow through the radiator and into the engine compartment allowing cooling. When cooling isn't needed the shutters are automatically closed, leaving the air to reroute around the vehicle. The result is less aerodynamic drag and reduced fuel consumption. An added benefit of active shutters is the reduced cold-weather engine warm up time.
- **Boat tail:** aerodynamic tail to make the truck streamlined and reduce drag. Elongated side panels maintain airflow with the long side skirts that reduce rear end drag.

Efficiency

- **Hybrid electric axle system:** electric motor and axle replacing the rear tractor non-driven axle. This provides a power boost while climbing grades, where the most fuel is consumed per mile. The hybrid axle uses regenerative braking to charge the battery pack by capturing energy while decelerating or while descending a grade.
- **Automatic tire inflation system** ensures consistent tire pressure for optimal fuel economy.
- **A downspeed axle configuration** using advanced engine controls and automated manual transmission provides improved efficiency as well as good pulling power.
- **5,000 watt solar array** on the trailer roof charges the main 48 volt battery bank on the tractor. The battery bank powers the cab air conditioning, and inverter for the 120 volt hotel loads. When down-converted to 12 volts by a cab mounted DC-to-DC converter, it will power the normal truck loads, such as lights, wipers, blower motors, gauges and other electrical components.

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HOW IS STARSHIP PUSHING THE LIMITS ON EFFICIENCY (CONTINUED)

Shell Technologies

- Starship utilizes full synthetic Shell Heavy Duty Engine Oil, blended to a low viscosity meeting the American Petroleum Institute FA-4 performance standard in a 5W-30 weight. The use of fully synthetic base oils, plus advanced additive technology provides protection against wear, deposits and oil breakdown, while also providing enhancements in fuel economy and high/low temperature performance. The lower viscosity delivers superior fuel economy than a conventional SAE 15W-40. The technology is the same as Shell Rotella® T6 Multi-Vehicle 5W-30, a full synthetic heavy duty engine oil that meets both the API CK-4 and API SN performance standards.
- Shell Rotella™ DEF Diesel Exhaust Fluid and Shell Rotella® Extended Life Coolant further helps keep the engine and cooling systems operating at peak efficiency.
- Starship uses full synthetic Shell Lubricants including Spirax S6 GXME 75W-80 transmission oil, Spirax S5 ADE 75W-85 differential oil and Spirax S6 GME 40 wheel hub oil.

“ The energy transition will play out over many years and it seems unlikely that any ‘silver bullet’ solution will emerge. In that sense, it’s useful to work out just how good we can be today if we draw together the most promising efficiency concepts into a single place... in effect being the best we can be every day. ”

Bob Mainwaring, Shell Lubricants Technology Manager for Innovation



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