

# SUMMARISING TECHNOLOGY ON THE TRUCK



Shell has collaborated with the Airflow Truck Company to design and build a hyper-aerodynamic, super fuel-efficient heavy duty concept truck: Starship (known as a Class 8 in the US). 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 OF EFFICIENCY

### Aerodynamics

- **Cab** is a bespoke hyper-aerodynamic design, fabricated of 100% carbon fibre.
- **Active grille shutters** (active based on temperature to maximise aerodynamics and maximise efficiency) when open, enable air to flow through the radiator and into the engine compartment allowing cooling. When cooling is not 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

- **Automatic tyre inflation system** ensures consistent tyre 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.
- **A 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.
- **Hybrid electric axle system (to be installed):** 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.

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## HOW IS STARSHIP PUSHING THE LIMITS OF EFFICIENCY (CONTINUED)

### Shell Technologies

- Shell provided technical consultation on engine and drivetrain components, as well as recommendations for lubricant needs for use in the Starship truck. The truck is using Shell's next generation, low viscosity, fully synthetic heavy duty engine oil. The use of fully synthetic base oils, plus advanced additive technology provides protection against wear, deposits and oil breakdown. The lower viscosity delivers superior fuel economy compared to a conventional SAE 15W-40. The lubrication technology shares the same viscosity as Shell Rimula Ultra E+ and is being tested by OEMs around the world.
- 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.

“ WE SEEK PROJECTS SUCH AS THE STARSHIP INITIATIVE TO KEEP SHELL AT THE LEADING EDGE OF TECHNOLOGY DEVELOPMENT AND ENERGY EFFICIENCY. WORKING WITH AIRFLOW TRUCK COMPANY AND OTHER SUPPLIERS GIVES SHELL LUBRICANTS THE OPPORTUNITY TO ALIGN WITH INNOVATIVE COMPANIES TO EXPLORE WHAT IS REALLY POSSIBLE IN FUEL EFFICIENCY ”

Bob Mainwaring, Shell Lubricants Technology Manager for Innovation



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