



SHELL STARSHIP 2.0

PUSHING THE BOUNDARIES
OF WHAT'S POSSIBLE IN
FUEL EFFICIENCY

**SHELL
LUBRICANT
SOLUTIONS**

THE POWER OF INNOVATION



Moving people and goods efficiently is vital to economic prosperity. Transport accounts for more than one quarter of the world's total energy use and one fifth of global energy-related carbon dioxide emissions. Increasing efficiency and fuel economy in the transport sector could make considerable progress in helping to reduce emissions.

We need to leverage the full power of innovation and collaboration to reduce CO₂ in the most socially, environmentally and economically responsible way. This means doing things differently, and better than before.

That's why we have designed and built Shell Starship 2.0 – a hyper-aerodynamic, super fuel-efficient heavy-duty concept truck. By bringing together the best of today's commercially available technologies, we aim to find out just how energy efficient goods transported by road can be today, and elevate the conversation about energy transition.

First launched in 2018, Shell Starship 1.0 shattered efficiency standards, so we took what we learned to the next level, and built Shell Starship 2.0.

In 2021, we took Shell Starship 2.0 on a coast-to-coast run like we did with Shell Starship 1.0, following the same route, in real-world conditions. This time we increased the average speed, and increased the payload to 47,100 pounds or 23.55 tons (21.36 metric tonnes).

If every truck in the United States could achieve Starship levels of efficiency, we could reduce CO₂ emissions by on-highway trucking by approximately 71.5%. That's avoiding 275 million tons of CO₂ emissions every year.



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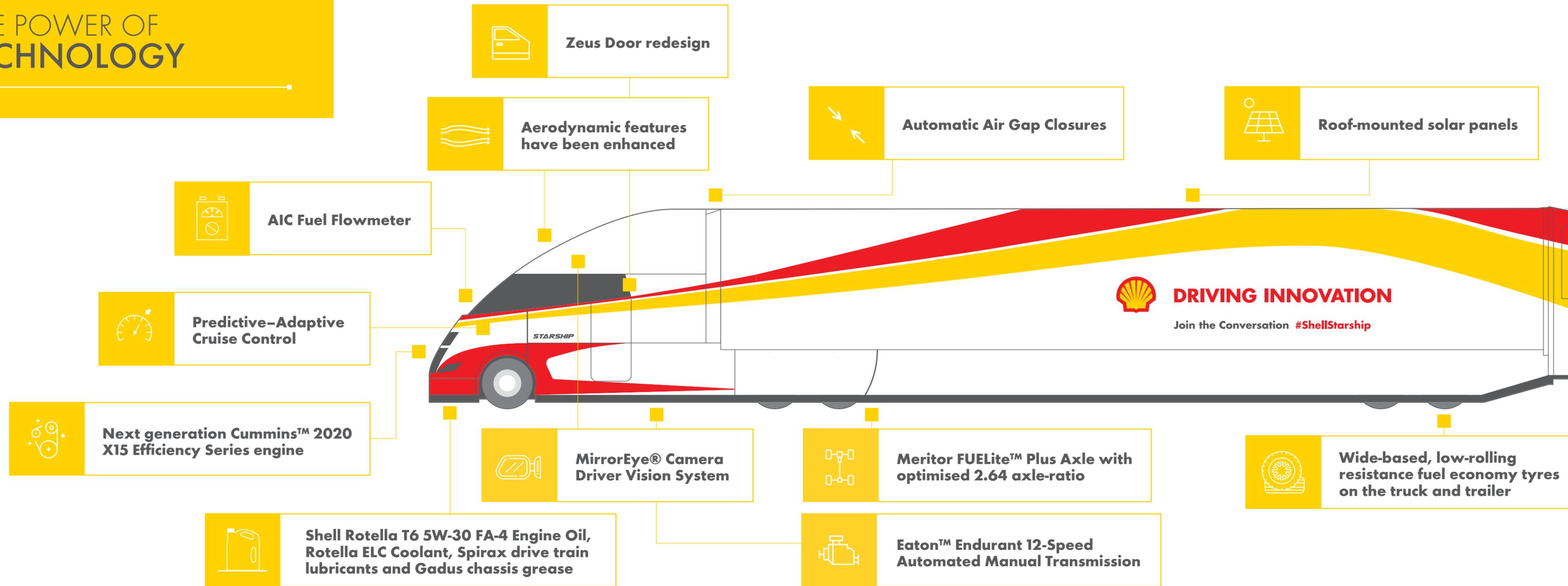
HOW SHELL STARSHIP 2.0 PUSHES THE LIMITS OF EFFICIENCY

USING TECHNOLOGIES THAT ARE AVAILABLE TODAY, SHELL HAS DESIGNED AN EXCEPTIONALLY ENERGY-EFFICIENT TRUCK CAPABLE OF REDUCING THE ENERGY USAGE ASSOCIATED WITH GOODS TRANSPORT IN A MATERIAL WAY

AERODYNAMIC DESIGN	HYPER-FUEL EFFICIENCY	ENHANCED SAFETY	ADVANCED SHELL LUBRICANT TECHNOLOGIES
<ul style="list-style-type: none"> ■ Carbon fiber cab designed for low aerodynamic drag ■ Integrated engine heat extractors on the truck skirt ■ Automatic gap sealer provides seamless continuity between the truck and trailer ■ Full-length side skirts minimise air movement under the truck and trailer ■ Aerodynamic boat tail streamlines air flow around the trailer and reduces drag 	<ul style="list-style-type: none"> ■ A 5,000 watt solar panel array mounted on the trailer roof helps to charge the main battery bank and reduce engine loading from the alternator ■ A wide-based, fuel-efficient tyre setup on the truck and trailer offers reduced weight and rolling resistance for improved fuel economy ■ A new drive train configuration optimises fuel efficiency and increases torque 	<ul style="list-style-type: none"> ■ Stoneridge MirrorEye® Camera Monitoring System eliminates driver blind spots, provides a greater field of view, and improves safety for everyone on the road, day and night ■ Predictive-adaptive cruise control helps smooth out any variability from the driver ■ Improved stability control and Anti-lock Braking System with front, tandem and rear axle disc brakes ■ Collision mitigation system with stationary object alert 	<ul style="list-style-type: none"> ■ Shell Rotella T6 Ultra 5W-30, FA-4, a fully synthetic heavy-duty engine oil that reduces internal engine friction while providing superior protection ■ Shell Spirax S6 GXME 75W-80 transmission fluid ■ Shell Rotella ELC coolant ■ Shell Gadus S5 V220 2 chassis grease ■ Shell Spirax S6 GME 40 wheel hub oil



THE POWER OF TECHNOLOGY



DEMONSTRATING WHAT IS POSSIBLE

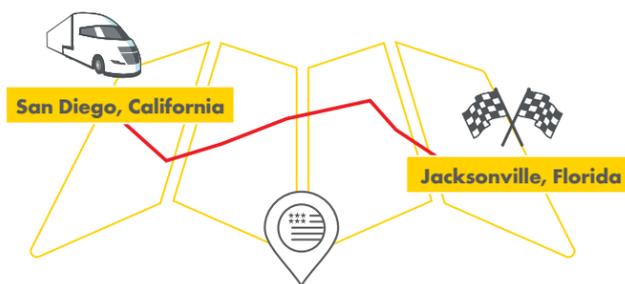
Shell has demonstrated the performance of Shell Starship 2.0 on a coast-to-coast run, measuring freight tonne efficiency and fuel economy along the way.

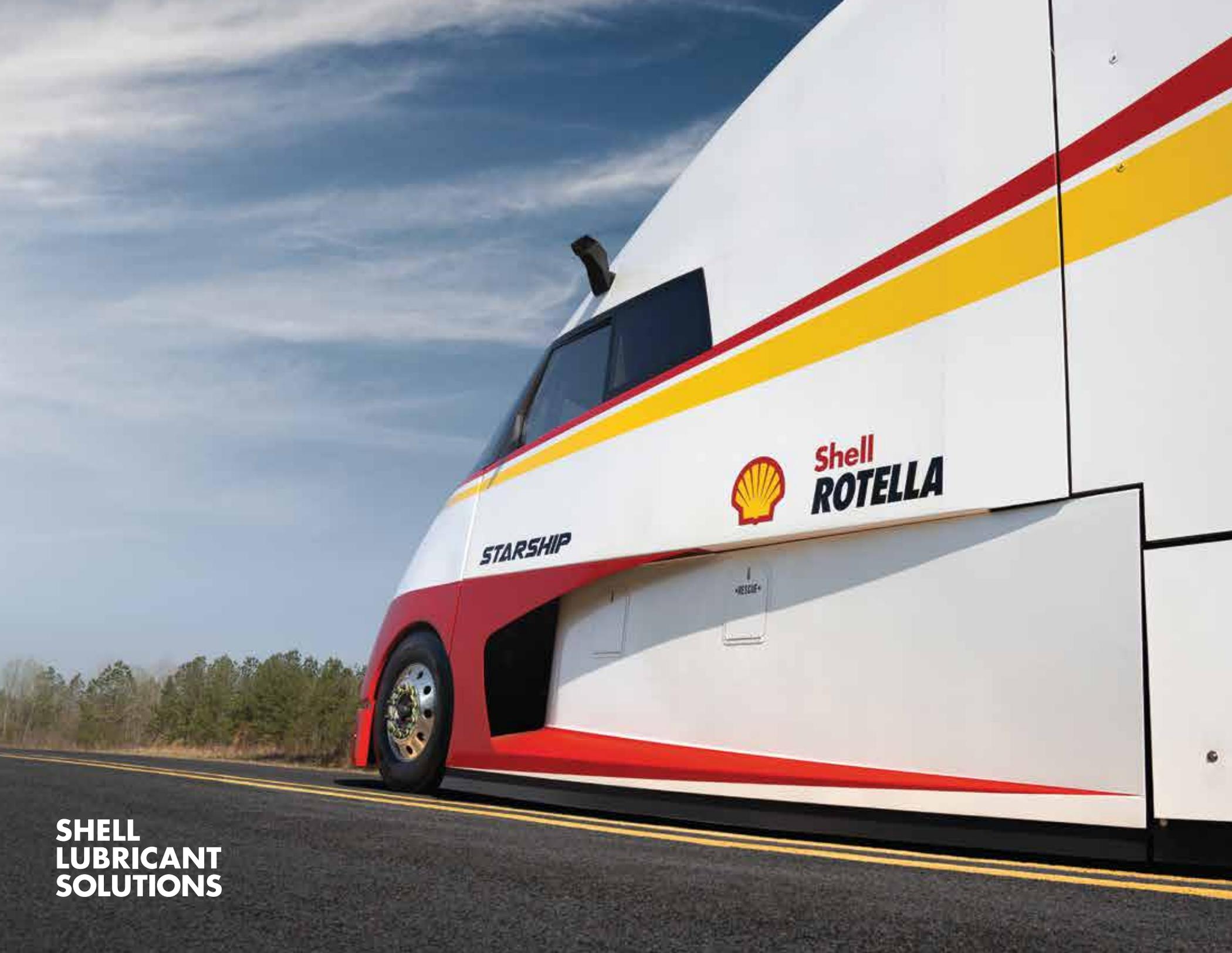
Freight tonne efficiency (FTE) is the primary indicator that was measured on Shell Starship 2.0. It is usually expressed as gallons/litres used per ton/tonne-mile/kilometre of freight transported, but, equally, can be viewed as the force opposing vehicle motion per tonne of goods carried. Efforts to minimise the forces opposing vehicle motion and to increase the mass of goods carried will drive improvement. The mantra for this is: load up – go slow – go heavy.

The truck was fully loaded, to a total gross vehicle weight of 79,500 lbs or 39.75 tons (36.06 metric tonnes), maximising freight tonne efficiency. Maximising the load the truck was

carrying could, in effect, decrease the fuel economy, however it would increase freight tonne efficiency and reduce carbon emissions for the amount of energy used to transport goods from point A to point B.

The truck was loaded with 47,100 lbs or 23.55 tons (21.36 metric tonnes) of sustainable reef materials that the Coastal Conservation Association would use to build an artificial reef off the coast of Florida.





STARSHIP



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