COLLABORATING IN SOLIDWORKS TO DESIGN A 'SUPERTRUCK'

The importance of commercial trucking to the economy cannot be understated, particularly when it comes to perishable goods and materials. As fresh produce is moved from warehouses to store fronts, buyers and suppliers are constantly looking for ways to reduce costs and ensure timely deliveries. This means scrutinizing every aspect of the process — including the traditional design of a semi-trailer truck.

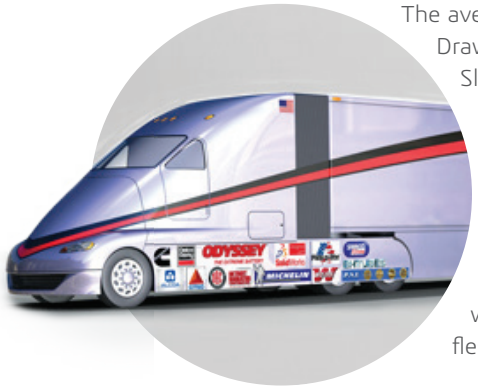
Jeremy Singley is not an engineer, at least not by trade. And yet, that didn't stop him from taking on the challenge of designing an ultra-aerodynamic tractor-trailer that can lower fuel consumption by up to 25 percent (according to its makers). It's an idea that can potentially save the industry more than 7.5 billion gallons of fuel and eliminate 21 million tons of toxic exhaust emissions annually.

Singley, owner of Jeremy Singley Industrial Design, has always been a bit unconventional when it comes to product design. "I've always been a hands-on 3D guy. I skip right over 2D design hand sketching," he noted. "I used to go straight to my furniture shop and slap together physical models out of scrap wood."

As Singley expanded his design capabilities, creating everything from power ports to rocking chairs, he looked to incorporate 3D CAD software and found SOLIDWORKS® design software to be the most accessible tool on the market. "I prefer SOLIDWORKS because it's intuitive to use, and it has its own intelligence. With SOLIDWORKS, the software will frequently override your mistakes or at least give you clear clues as to what you need to correct. I like that."

Sharing his designs through the SOLIDWORKS community, it didn't take long for Singley to attract the attention of Bob Sliwa — a former trucker, drag racer and owner of AirFlow Truck Company — who was looking for someone to help develop a new kind of truck.

IDENTIFYING AN OPPORTUNITY FOR INNOVATION



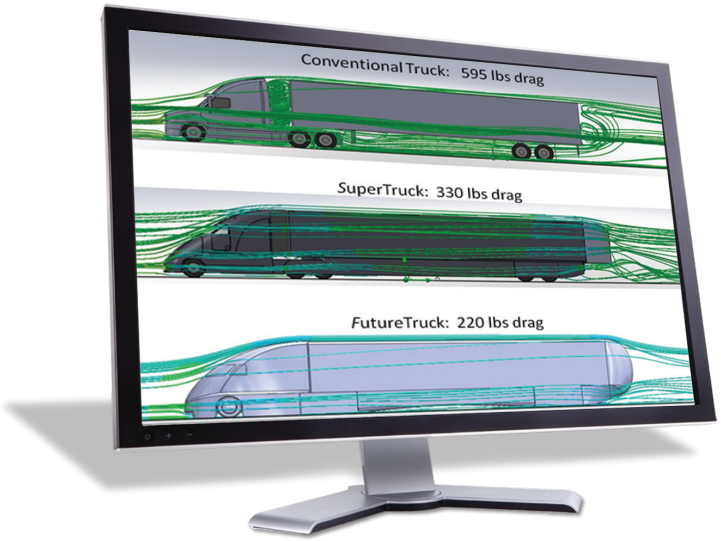
The average semi-trailer truck gets 6 or 7 miles per gallon (MPG). Drawing on his racing experience and passion for truck design, Sliwa calculated that he could increase that number to about 15 MPG if the drag was decreased by 60 percent. He wasn't alone either. More than 20 corporate sponsors, including CITGO, Alcoa, and Michelin were eager to see it happen.

When Sliwa initially reached out, Singley jumped at the opportunity, and without ever meeting in person (only working indirectly over the telephone), the two began to flesh the idea out.

OVERCOMING THE TWO BIGGEST PROBLEMS

Not surprisingly, one of the biggest detriments to efficiency in a truck is the head. Comprised of blocky geometry, flat surfaces, and giant grills, it contributes to a significant amount of drag. With that in mind, the initial idea for the SuperTruck was to develop a kit that would allow operators to replace the original front end of their trucks with a more streamlined option. Sliwa relayed his expertise and intuition to help identify the right specs to Singley, who then took those specs and translated them into a SOLIDWORKS CAD model.

With SOLIDWORKS Flow Simulation, Singley was able to make appropriate changes and then immediately see new results. "I found that viewing flow over specific surfaces suggested new shapes to try. Often, something that's happening at the truck's front grill will cause turbulence 20 feet behind the truck," he explained.



Singley relied on SOLIDWORKS Flow Simulation to run an analysis on the truck and trailer, and determine the actual aerodynamics of the design.

This led to the second design-related problem: a truck's square-shaped back ends create a huge vacuum that stretches behind the truck for several hundred feet. Solving this problem required a more curvaceous boat-tail and redesigned skirt.

After running airflow analyses and making the changes necessary, Sliwa began building a prototype for real-world tests. The curved shape of the SuperTruck prototype cleaves the air more efficiently than traditional designs, reducing drag on the truck and lowering fuel consumption. And none of it would have been possible without SOLIDWORKS.

TOOLS SHOULD NEVER BE AN OBSTACLE TO CREATIVITY AND INNOVATION

Great ideas pop up daily, and inspiration can come from anywhere — even a simple conversation between two like-minded enthusiasts looking for a way to challenge conventions and reshape the rules of vehicle design. That's why improving ease-of-use is a constant priority at SOLIDWORKS. Discover it for yourself and sign up for a free trial of SOLIDWORKS 2017.

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