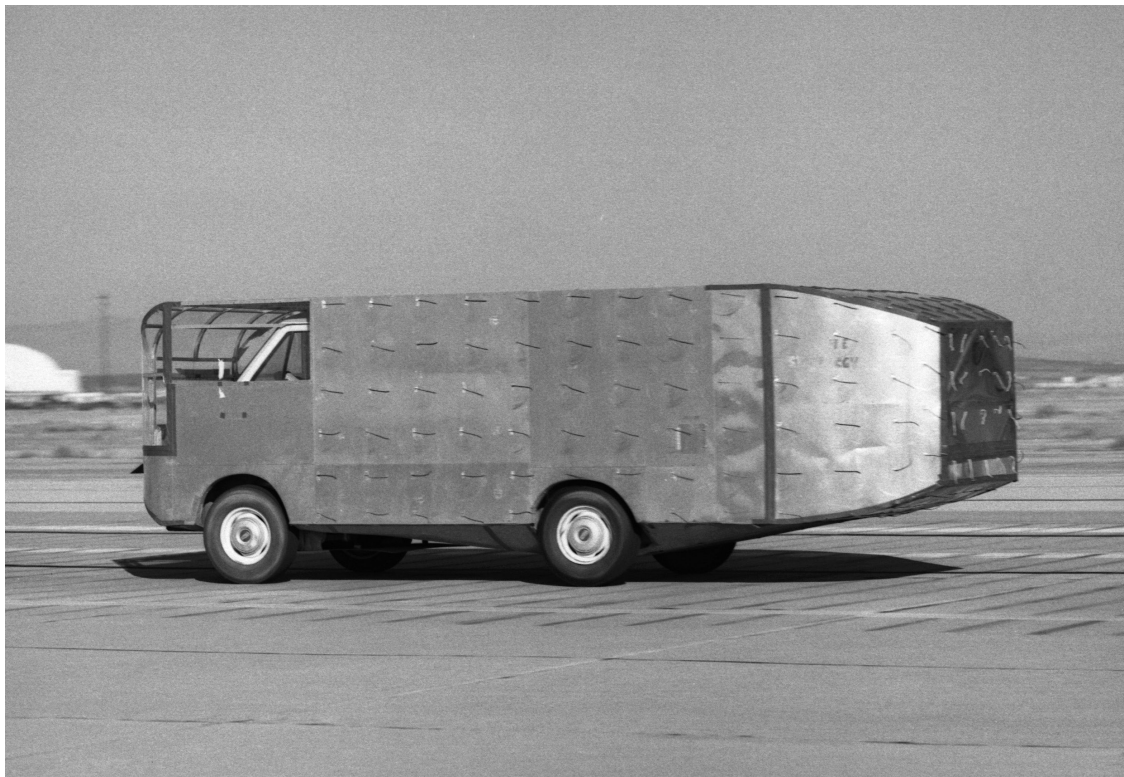




Aerodynamic Truck Studies



This photograph illustrates a standard passenger van modified at the Dryden Flight Research Center to investigate the aerodynamics of trucks. The resulting vehicle, modified with sheet metal, resembled a motor home, with rounded vertical corners on the vehicle's front and rear sections. For subsequent tests, researchers installed a "boat tail" structure, shown in the photograph. (NASA photo)

During a decade spanning the 1970s and 1980s, NASA Dryden Flight Research Center, now NASA Armstrong, researchers conducted tests to determine the extent to which adjustments in the shape of trucks reduced aerodynamic drag and improved efficiency. The techniques honed in the investigation of truck aerodynamics proved highly applicable.

Felt tufts, or strings, were fitted to the vehicle's sides to show airflow. The investigators concluded that rounding the vertical corners, front and rear, reduced drag by 40 percent, yet decreased the vehicle's internal volume by only 1.3 percent. Rounding both the vertical and horizontal corners cut drag by 54 percent, while losing only three percent of internal volume.

The first phase involved a cab-over tractor-trailer, modified by rounding all of its front corners and edges. In addition, technicians attached sheet metal fairings over the cab's roof and sides as far back as the trailer. This covering closed the open space between the cab and trailer. During the phase one research, researchers found that in highway driving at 55 miles per hour, rounding the corners and fairing the space to close the gap between the truck's cab and trailer resulted in a significant reduction in aerodynamic drag and in 20 to 25 percent lower fuel consumption than the standard vehicle. The improvements soon spurred design changes in production trucks.

The second phase conducted on the modified passenger van entailed such modifications as

rounding the vertical and horizontal corners, as well as adding a "boat tail" structure to the rear of the vehicle and a faired underbody. The modified van, with rounded vertical corners front and back, experienced 40 percent less drag than the standard configuration. With the rounding of horizontal corners as well, drag reduction rose to 54 percent. Further testing included the addition of a faired underbody and a boat tail, the latter feature

resulting in an additional drag reduction of about 15 percent.

Based on the research conducted at NASA Dryden, many truck manufacturers subsequently incorporated similar improvements and design modifications in their production trucks.



Application of aerodynamic design principles to the design of large truck cabs by NASA Dryden researchers in the mid-1970s led to the adoption of those standards by most manufacturers of large trucks on the road today. (NASA Photo)

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