Reducing Aerodynamic Drag on Empty Open Cargo Vehicles

Open cargo bays are subdivided by means of simple partitions.

Ames Research Center, Moffett Field, California

Some simple structural modifications have been demonstrated to be effective in reducing aerodynamic drag on vehicles that have empty open cargo bays. The modifications were originally intended to be made in railroad coal cars because the amounts of coal and the distances over which they are transported by railroad in the United States are so large that the resulting reduction in drag could, potentially, result in an annual saving of millions of gallons of diesel fuel.

The basic idea is to break up the airflow in a large open cargo bay by inserting panels to divide the bay into a series of smaller bays. In the case of a coal car, this involves inserting a small number (typically between two and four) of vertical full-depth or partial-depth panels. For example, as shown in Figure 1, two triangular partial-depth vertical panels can be conveniently attached to triangular braces that are already integral parts of a typical coal car.

In an experiment, measurements of aerodynamic drag on models of coal cars were made in a wind tunnel. The results of the measurements, summarized in Figure 2, clearly show the drag-reducing effects of the dividers; they also show that the braces also contribute small reductions of drag.

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Inquiries concerning rights for the commercial use of this invention should be addressed to the Ames Technology Partnerships Division at (650) 604-2954. Refer to ARC-15422-1.

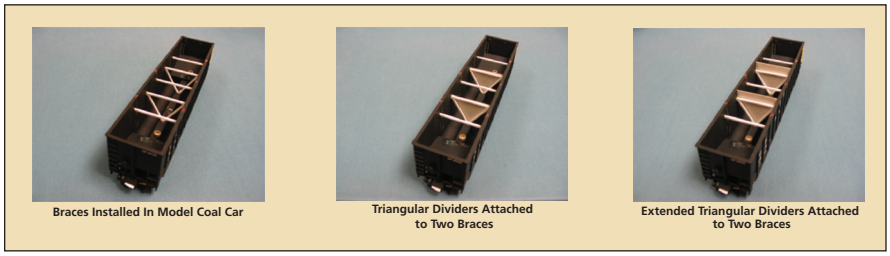

Figure 1. **Triangular Dividers** can be attached to triangular braces in a typical coal car to reduce aerodynamic drag when the car is empty.

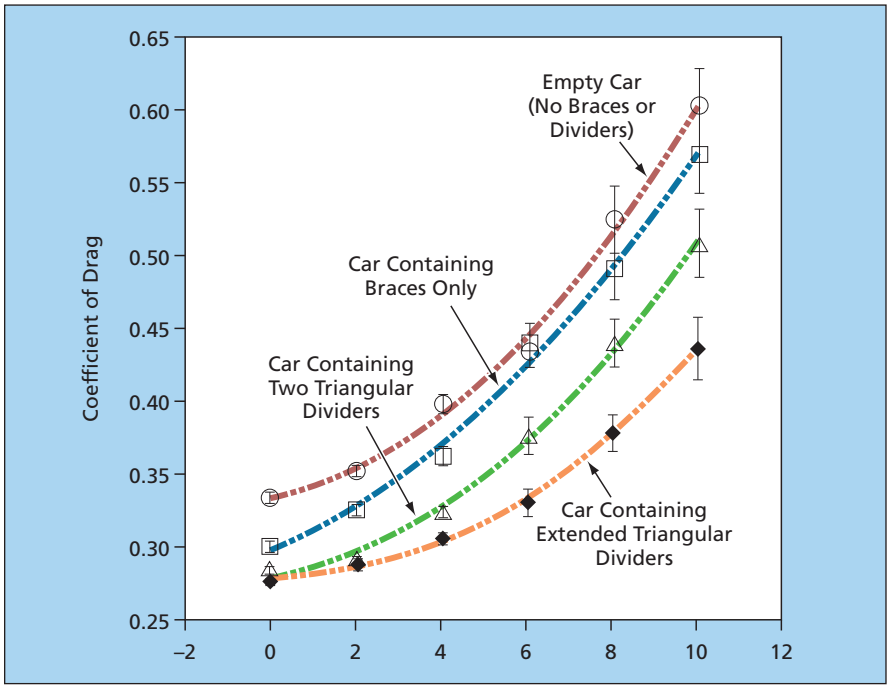

Figure 2. **Wind-Averaged Data** on the coefficient of drag were obtained in wind-tunnel tests of coal-car models like those of Figure 1. The yaw angle is the angle between the relative wind and the longitudinal axis of a car.

Rotary Percussive Auto-Gopher for Deep Drilling and Sampling

A drilling/sampling apparatus braces itself against the side of the hole.

NASA's Jet Propulsion Laboratory, Pasadena, California

The term "rotary percussive auto-gopher" denotes a proposed addition to a family of apparatuses, based on ultrasonic/sonic drill corers (USDCs), that have been described in numerous previous *NASA Tech Briefs* articles. These apparatuses have been designed, variously, for boring into, and/or acquiring samples of, rock or other hard, brittle materials of geological interest. In the case of the rotary percussive auto-gopher, the emphasis would be on developing an apparatus capable of penetrating to, and acquiring samples at, depths that could otherwise be reached