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# Aerodynamic Truck

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## INTRODUCTION

A large part of today's transportation of cargo is carried by trucks. In recent years focus has been on optimizing the front end of the truck, and great advances in aerodynamics have been obtained. However, there has been almost no development on the rear of the trailer, which takes up a large part of the drag, due to the turbulent wave it creates behind. Our question; Is there a smart way of letting the air leave the back of the truck, that reduces the total drag, and thereby reduces the fuel consumption and environmental impact? Many creative models have been tested in wind tunnel, and we have come up with a solution that is both practical and very fuel efficient. Our design proposal is estimated to make a total reduction of drag coefficient by around 10%, estimated to give around a 5 % reduction in fuel consumption. With all international trucks fitted with our arrangement, a substantial reduction in the $CO_2$ emission from long range vehicle transportation can be made possible.

## RESEARCH

Hours have been spent on idea development, planning and execution of wind tunnel tests. Studies of test data results were performed, and a clear picture of the factors affecting the drag was uncovered. The next step, which might be almost as important, was how to attach the product on to the truck. Both government and EU regulations, but also preferences and restrictions from the cargo carriers had to be taken into account. Many green eco-friendly products fail because of lack of usability and durability. A complicated, inconvenient and troubleful design might quickly be phased out due to the problems it would bring to the operation. We have held interviews with carriers having hands-on experience with operation and loading of trucks to assist us in taking the correct design choices.

## THE TAIL DESIGN

We have come up with an easy to implement, easy to operate system of aerodynamic doors, directly attachable on existing trucks doors. Our findings from the wind tunnel tests showed that plates placed in an accurate angle would delay separation of air behind the truck, reducing the drag significantly. The tests showed that the optimal shape of the tail was a complicated cone, but that the effectiveness of the tail was reduced marginally when approximating the shape with a much easier to create edged design. The stress on the tail is very low, making it possible to use simple materials and manufacturing processes, altogether making the environmental impact on production minimal.

## CONCLUSION

We can conclude that it is both possible and favorable to implement this kind of drag enhancement on today's long range trucks. The advantage is the simple design, simple implementation and simple operation with surprisingly great effect. 15 years ago, no trucks drove with an aerodynamic 'hat' on the drivers cabin, we hope that 5 years from now, no long range truck drives without an aerodynamic tail.