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 CO₂ 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 troublesome 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.

Design of a new concept of product tanker

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GENERAL DESCRIPTIONS
The vessel is built to answer to a continue request of energy-saving and less CO₂ emission way of oil transport in the market trend. The Product Tanker with twin podded propulsion alimentated by diesel gensets, respecting the actual TIER. The main features in the design and construction are pointed to a higher safety, less EEDI final index and to less initial and maintenance costs. Due to the common shipyard elevation capacity (supposing a crane which can lift objects weighing 2000 tons, at 20-33 m outreach at 70m elevation and 50tons at 95 m outreach and 43 m elevation), the vessel has to be built in 6 separated main blocks. A continuous single deck from fore to aft is located at D=19m. Twelve (12) cargo tanks of about 22 m length are provided, answering the request of 55000 m. of liquid with a Cargo specific gravity 0.85 ton/m. A single accommodation block is located before the cargo tanks, with five decks, 22 cabins and a wheelhouse offering all-round vision located above and after. To ensure safe and good maneuverability characteristic, also having a double podded propulsion, a bow thruster is provided in the forward part. Seven main corrugated transverse bulkheads subdividing the hull below main deck. MDO tank arranged in a side of engine room longitudinal position.

PRINCIPLE DIMENSIONS AND CHARACTERISTICS
Length Overall LOA : 182.000 m
Length of Waterline ( Summer ) LWL : 176.100 m
Length between perpendicular LPP : 166.450 m
Length of Subdivision : Approx. 30.000 m
Moulded Breadth B : 32.200 m
Depth D : 19.000 m
Design Draft (Scantling ) T : 12.000 m
Summer Draft Ts : 11.990 m
Design Draft Td : 11.900 m
Total Block Coefficient at Td Cb : 0.814
Cargo Tank Capacity about : 56000 m.
Slope Tank Capacity about : 2000 m.

SPEED AND ENDURANCE
The service speed of about 14 knots in deep and calm weather (Smooth sea with wind force not exceeding Beaufort scale 2) with no current presence.

PROPELLATION AND MANEUVERING SYSTEM
- Podded Propulsion : Approx. 2 * 6000 kw
- Bow Thruster: One (1) Tunnel thruster L-Drive 1100 HP, 66 inch od diameter

CONCLUSIONS
The project have developed a new tanker concept, which could be collocate in the actual market situation. An analysis of the last market trend and oil prices have been made to take in account of the possibility and feasibility of the designed construction. The final result is that if new propulsion characteristic are provided, this new product tanker type could be seen as a way to save money in the the liquid transport market and therefore also in oil one.