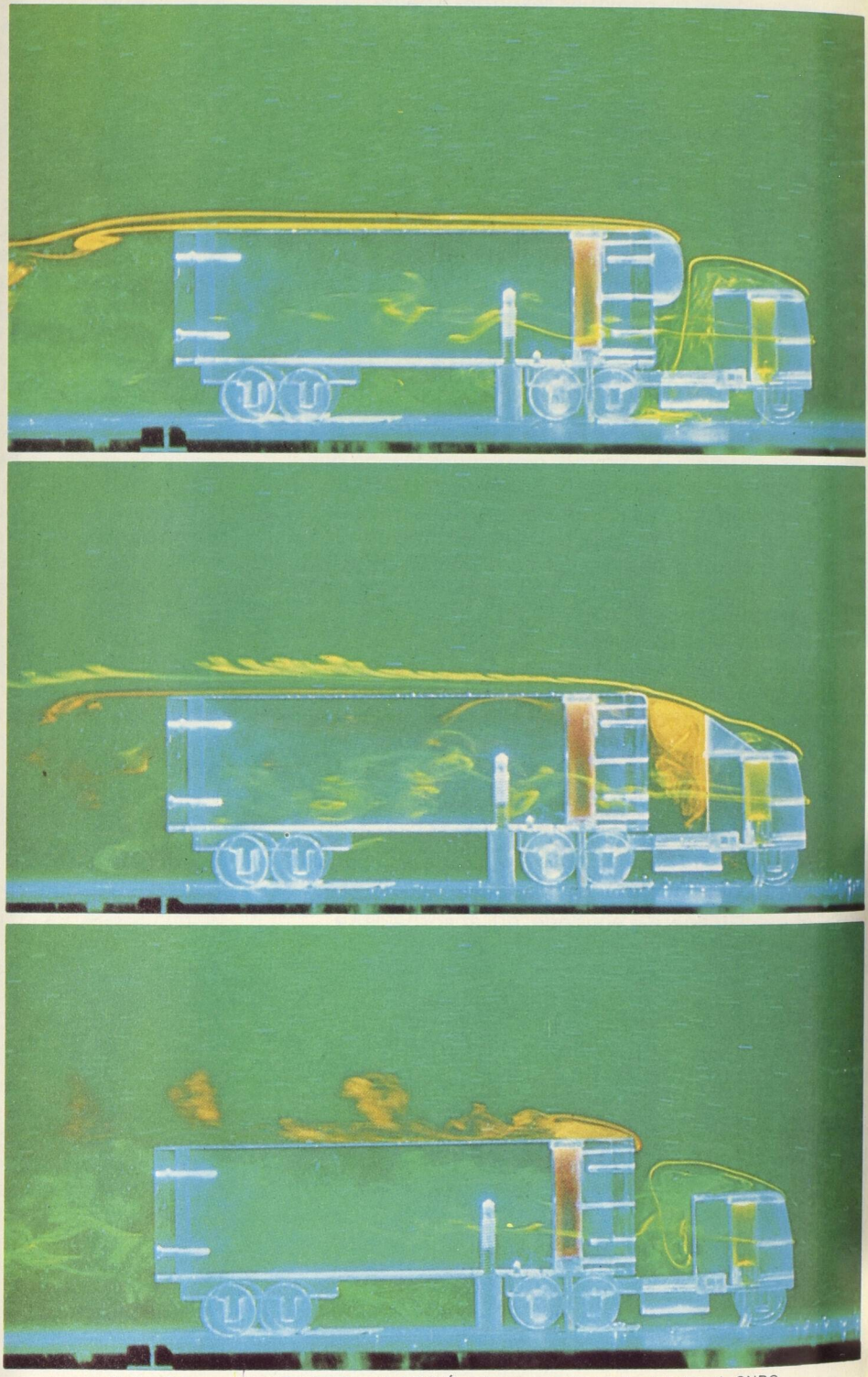
Streamlining truck design — Foiling the wind

The Low Speed Aerodynamics Laboratory at NAE has carried out a number of tests aimed at reducing the air resistance on trucks by using deflectors, nosecones and rear-end moldings. The study has shown that fuel savings as high as eight per cent can be achieved when the streamlining of certain kinds of trucks is improved.

For some years now, the aerodynamicist's expertise has been essential to the designers of grand prix racing cars, as these vehicles have sprouted wings fore and aft in an effort to improve roadholding. The "wings" generate negative lift — a downwards force providing extra vertical load to offset the horizontal forces generated in cornering. This design feature spilled over to the production lines of the "big four" automobile manufactures and soon motorists became used to the sight of high performance cars sporting a variety of strut-mounted aerofoils or a more modest upward curve designed into the rear deck as a "spoiler". Though in some cases the effect was more cosmetic than anything else, the intention was that at high speeds the spoiler or aerofoil would reduce lift or generate a downward force on the rear end of the car to improve traction and stability. The aerodynamic add-on was the badge of the muscle car.

The observant motorist might have noticed recently that an increasing number of large trucks are now sporting spoilers of a kind on their cab roofs. Does this mean that the trucking industry is going into the racing business? Can we expect a Can-Am series devoted to 20 wheelers? No, not exactly. The "spoilers" are in fact air deflectors designed to reduce the aerodynamic drag of the vehicles and are coming into increased use as truck operators discover that significant fuel savings are possible. A researcher at the National Aeronautical Establishment's Low Speed Aerodynamics Laboratory has undertaken a series of wind tunnel tests of truck models fitted with various types of deflectors to assess their drag-reducing properties and to investigate other possible modifications to tractor trailer units to improve their aerodynamic performance. Kevin Cooper is carrying out this program in association with CP Transport, whose ready access to data on trucking operations will be useful in the comparison of actual operational experience and the predictions from model tests.



National Aeronautical Establishment, NRC/Établissement aéronautique national, CNRC

Yellow dye in flowing water allows researchers to vizualize the air flow around a tractor-trailer. In these pictures of a transparent model in NRC's water tunnel, the smooth flow behind a nose cone (top), and a cab-mounted deflector (center), can be compared with (bottom) the turbulent flow around a unmodified truck. Turbulence causes drag, while smooth flow permits more economical performance.

Le colorant jaune ajouté à l'eau permet aux chercheurs de visualiser l'écoulement de l'air autour de cette maquette transparente de semi-remorque placée dans un tunnel hydrodynamique. Elle permet de comparer l'écoulement non perturbé derrière un carénage aérodynamique (en haut) et un déflecteur (au centre) avec (en bas) un écoulement tourbillonnaire autour d'un camion non modifié. La turbulence engendre une traînée alors que l'écoulement non perturbé fait réaliser des économies.