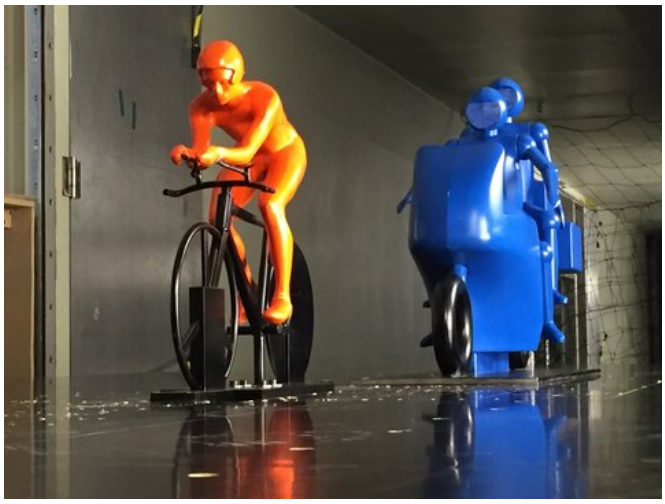
Racing cyclist benefits from motorcycle right behind him

3 May 2016



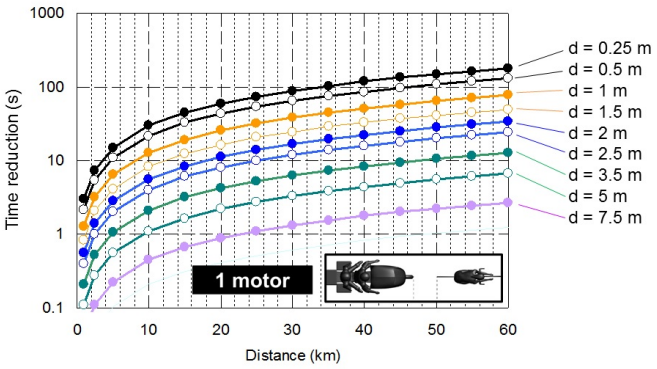
Scale models used for the wind tunnel measurements. Credit: Eindhoven University of Technology

Research at TU Eindhoven, KU Leuven and the University of Liege has shown how a motorcyclist riding right behind a racing cyclist can reduce the air resistance for the cyclist by almost nine percent. In a time trial, such as this Friday's forthcoming prologue in the Giro (Tour of Italy) in Apeldoorn, this could mean a decisive advantage. The researchers advise the UCI (International Cycling Union) to extend the minimum distance between motorcycle and cyclist, also from a safety perspective, to 20 or 30 meters.

In cycling races there are many motorcycles present, for instance for reporters and photographers, often riding very close to the riders. The discussion concerning the number of motorcycles in the race has once again been ignited by several incidents involving motorcycles, including the recent death of the 25 year-old Belgian cyclist Antoine Demoitié following a collision with a motorcycle in the Gent-Wevelgem race. Research by TU Eindhoven, KU Leuven and the University of Liege, supervised by TU/e professor and keen cycling fan Bert Blocken, reveals that motorcycles can also have a decisive role in the outcome of a race from an aerodynamic perspective.

Less air resistance

The researchers used computer simulations and wind tunnel measurements of scale models of a time trial rider and a motorcyclist to calculate that a motorcycle at a distance of 0.25 meter behind the cyclist can cut the air resistance by almost 9 percent. If there are three motorcycles, the reduction can be as much as 14 percent. Race pictures suggest that such short distances are certainly not uncommon in elite races.



Graphs of the time gained (vertical axis) depending on the time trial distance (horizontal axis) for different following motorcycle distances (d). Credit: Eindhoven University of Technology

Up to a minute gained

The researchers calculated the time that can be gained in a time trial for various distances between the cyclist and following motorcycle. Depending on how long a motorcycle rides behind the cyclist in a

short time trial like the Giro prologue (9.8 kilometer), this distance, something that almost never happens a few to several seconds can be gained. Time trials in reality. They join the riders in asking the UCI to are often won by very narrow margins. In the longer take stricter action concerning in-race motorcycles. time trials, the difference could be up to a minute.

Provided by Eindhoven University of Technology

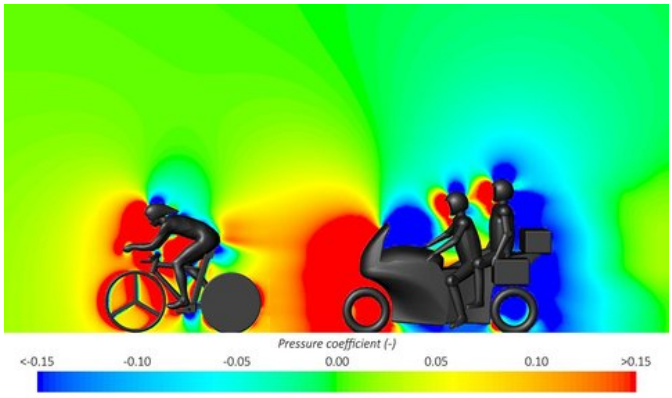


Image of computer simulations with colors depicting different pressure levels. The motorcycle follower causes a reduction in the low pressure area behind the rider (red area), thereby reducing the aerodynamic drag. Credit: Eindhoven University of Technology

Unprecedented research

Last year the TU/e researchers showed that a following car could give a rider a time advantage by driving close behind the rider. Now it appears that the aerodynamic benefit provided by a following motorcycle is even greater, mainly because motorcycles tend to ride much closer behind the cyclist. But now, for the first time, this 'following effect' of motorcycles and following vehicles has been investigated in detail. Evidence suggests that the effect is much greater than previously thought.

UCI must modify the rules

The researchers advise the UCI to modify the rules on motorcycles in cycling races not only from a safety perspective but also given the measured undesirable aerodynamic advantages that riders could gain. They are appealing for the regulatory ten meter distance to be increased to thirty meters and, moreover, to ensure there is compliance with