

# Slotted buses keep passengers cool

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A simple redesign of public buses used in hot and dry climates could make passengers more comfortable without the need to use extra fuel running air conditioning, according to a study published in the *International Journal of Heavy Vehicle Systems*.

Sunil Kale of the Department of Mechanical Engineering, at the Indian Institute of Technology Delhi, India, and colleagues point out that the majority of passenger trips are taken in open window buses.

Worldwide, buses are the principal means of commuting within and between cities, the researchers explain. For cost reasons, particularly in the developing world, only a small fraction (less than 5%) of inter-city vehicles are air-conditioned. They add that air-conditioning is not a commercially or environmentally viable alternative to simply opening the side windows and even the doors.

Opened windows are supposed to improve airflow and keep passengers cool while the [bus](#) moves. However, the cooling effect of open side windows is inadequate for comfort in the hottest parts of the world on a crowded bus.

Kale's team has now carried out an aerodynamic study of fluid flow in a 1:25 model. Their findings suggest that a few simple modifications to conventional design could significantly boost cooling airflow with none of the cost or energy requirements of an air- conditioning system.

The [turbulent flow](#) into a standard bus does not allow air into all areas.

Passengers sitting near or standing in the aisle do not receive any ventilation, while those in the front seats receive airflow from the rear. The team has found that a wide vent at the front and rear of a bus will draw air into the bus at a much better rate than side windows. A similar boost can be obtained with adjustable roof vents.

These modifications would allow cooling air to increase the comfort zone of the bus from a mere 11% of the interior volume to more than 50%. This means that all passengers will experience some cooling airflow. In addition to improved comfort there is an overall reduction in drag. Some of this drag reduction could be sacrificed to provide grills and filters to prevent the influx of insects and dust. Optionally a passive evaporative cooling system could be incorporated into the vents to cool the incoming air and further boost the comfort inside the bus.

"In a long-term policy perspective of sustainable transport, buses form an important mode of transport that needs to be strengthened," the researchers say, "Besides improving fuel economy, passenger comfort is a major issue with such buses especially in tropical climates."

More information: "Aerodynamics of a bus with open windows" in *International Journal of Heavy Vehicle Systems*, 2009, 16, 459-488

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