

Paint Innovations Helping to Improve Vehicle Efficiency

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When it comes to fuel economy, lightweight design and temperature control are important considerations for cars and airplanes alike – and the impact of a coat of paint might surprise you. Vehicles with more reflective coatings or with less paint can be more efficient.

[According to the U.S. Department of Energy](#), hot weather can increase vehicle fuel economy because engines warm up to an efficient temperature faster, summer grades of gasoline can have slightly more energy, and warm air causes less aerodynamic drag than cold air. However, the use of air conditioning can reduce a vehicle's fuel economy by more than 25 percent in very hot conditions.

The reflectiveness of a vehicle's paint can help regulate its internal cabin temperature and reduce the need for passengers to use the air conditioner. White and silver paints are inherently more reflective: White paint reflects about 70 percent of the sun's rays while silver paints reflect between 50 and 55 percent due to the mica flakes that make them sparkle, [according to Wired](#). Various solar reflective paints have been developed over the years to try to repel more infrared heat, or in other words, minimize the amount of heat that exterior paint absorbs.

“We expect heat increase control of around 5 degrees Celsius [9 degrees Fahrenheit] when comparing vehicle body surface temperature with and without thermal barrier function under the scorching sun in summer,” Toyota spokesman **Takashi Ogawa** said.

The company stated that one challenge of the product's development was balancing its thermal properties and durability; Ogawa says that making the titanium oxide particles larger enhances heat resistance but makes it more difficult for the paint to adhere onto the base coat.

Toyota has not disclosed how much gas the paint might save, nor why it will only initially be available in Japan. Lending some insight, *Wired* referred to a [2011 study](#) published in *Applied Energy* which found that a silver car with a solar reflective coating required 13 percent less air conditioning to cool the cabin to a baseline of 77 degrees Fahrenheit compared to an otherwise identical black car.

Regarding the potential environmental impacts of solar reflective paint on vehicles, a [2009 study](#) demonstrated that although solar reflective paint only improved actual fuel efficiency by 0.9 percent in private use and 0.2 percent in commercial use, its cost was significantly lower than

other emissions reduction measures. The 2009 study estimated that if this paint was applied to all passenger cars in Japan, the CO2 reduction would be about 210,000 tons per year, which is equivalent to roughly 1.5 percent of Japan's 1.4 billion tons of annual emissions.

Meanwhile, **KLM Royal Dutch Airlines** has specified **AkzoNobel's** new base coat and clear coat system for its fleet of **Boeing 787-9** Dreamliners, the first of which began flying late last year. KLM reports that the "gleaming finish" required [15 percent less paint](#) than previously used coatings, offering a potential weight reduction and helping to lower fuel costs.

AkzoNobel claims that the base coat and clear coat system is typically lighter than conventional systems, among other benefits: It has a smoother surface that reduces dirt adhesion for less frequent and easier cleaning, has reduced drying times, and includes UV protection for colors which extends the time between repainting. The product's improved performance reflects AkzoNobel's [broader goal](#) of achieving 25 to 30 percent more efficient resource and energy use across its entire value chain by 2020.

[According to KLM](#), the paint is one of several features of the aircraft that help it fly further, faster, cleaner, quieter, and more efficiently than comparable aircraft. The Boeing 787-9 Dreamliner is about 20 percent more fuel efficient than comparable aircraft, and is 46 percent more fuel efficient than KLM's Boeing 747-combi aircraft. KLM expects to have ten Dreamliners in its fleet by the end of this year, and has plans to put a total of 21 into service over time.

"The Dreamliner represents an exciting new phase for our company," said **Inka Pieter**, KLM's Director of CSR and Environmental Strategy. "It will make an important contribution in helping us to achieve our sustainability goals and we're very happy to have AkzoNobel on board."

KLM's climate action plan aims for a 20 percent reduction in CO2 emissions by 2020 compared to 2011. Among other initiatives, KLM and Boeing have both been involved in the development of biofuels for use in aircraft: In 2013, KLM announced it would operate [weekly transatlantic flights](#) from New York to Amsterdam using a [biofuel mixture](#), and Boeing announced it would [work with the USDA and other partners](#) to support the annual production of 1 billion gallons of aviation biofuels by 2018.

Similar to Toyota's reflective paint innovation, AkzoNobel has previously developed [exterior wall paints that reflect more infrared light](#) to reduce the heat absorption and energy consumption of buildings.
