Evaluating Ahmed Bodies as Predictors for Surface Dimpling on Automotive Drag

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Growing automotive emissions are contributing to climate change and a decrease in air quality. Reducing these emissions is a prevalent concern and drag reduction technology is one method of combating this issue. An emerging technology is surface dimpling, which has previously been tested on Ahmed bodies. Ahmed bodies are simplified car models for research. These bodies have shown that surface dimpling can decrease drag, yet few automotive designs have been appraised. This project tests surface dimpling on a Tesla Model Y and a Toyota Sienna to determine if surface dimpling reduces drag. These results were compared to a manufacturing standard. Surface dimpling was found to be effective for the Toyota Sienna, with a decrease in the drag coefficient of 31.88% from 100 samples, and a p-value of ˜0 was achieved. Surface dimpling of the Tesla Model Y showed an increase in drag, with an increase of 14.12% for the drag coefficient. A p-value of ˜0 was achieved with 100 samples. After comparison with the Ahmed body, a difference of 19.41% was found with the Toyota Sienna, and a difference of 77.45% was found with the Tesla Model Y. Results indicate that Ahmed bodies are not efficient research models for surface dimpling. Findings also indicate that, for certain vehicle types, surface dimpling is still a potential technology for drag reduction. However, manufacturing feasibility has not been evaluated.

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