ABSTRACT

The importance for developing energy efficient trains is increasing with rising energy prices and one major way to achieve this is by reducing the drag experienced by the prime mover and coaches. Above 30kmph, aerodynamic drag effects plays a vital role and certain trains in our country. Inspite of having an average velocity of about 100kmph Rajdhani, Duronto, Shatabdi and other high speed train express have the same external features as their low speed counter parts. This project work aims to attain a considerable decrease in the drag force by closing the gap between the carriages and incorporating a tail fairing at the tail end of the train along with the wake profile.

Firstly, the drawings of the coaches were obtained from Indian Railways and computer models were generated in Solid works. A Grid independent study was done to decide the mesh settings to be used throughout the project. The models were then analysed in ANSYS CFX and from the data obtained, the changes (i.e., fairings) were incorporated. These new models were again analysed and it was found that the drag forced dropped considerably.

The procedure was repeated for different velocities and a minimum total drag reduction of 30.7% at a velocity of 70kmph and maximum total drag reduction of 34.66% at a velocity of 120kmph has been observed.

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