ABSTRAK

Penelitian ini membahas analisis mengenai hubungan antara kecepatan lokomotif terhadap besarnya hambatan udara yang terjadi pada lokomotif CC 300, salah satu lokomotif yang digunakan di Indonesia saat ini. Berdasarkan hasil analisis tersebut, dibuat opsi geometri alternatif untuk lokomotif CC 300. Pada opsi geometri, dilakukan perubahan pada struktur depan lokomotif dengan metode menambah nilai radius sebesar 1000 mm dan 300 mm pada sudut lancip agar dapat mengurangi besar hambatan udara yang terjadi. Kecepatan lokomotif CC 300 dalam penelitian ini divariasikan mulai dari 120 km/jam hingga maksimum kecepatan rencana 160 km/jam dengan penambahan 10 km/jam. Berdasarkan hasil simulasi menunjukkan bahwa semakin besar kecepatan lokomotif maka nilai *coefficient drag* (Cd) akan cenderung konstan. Pada perubahan geometri lokomotif, diperoleh hasil desain optimasi dapat menurunkan nilai *coefficient drag* (Cd) secara signifikan. Pada kecepatan 140 km/jam *coefficient drag* (Cd) sebesar 0.75138784 pada desain *existing* dan turun menjadi 0.45187151 pada desain optimasi. Didapatkan juga desain optimasi pada kecepatan 140 km/jam mampu mereduksi *coefficient drag* (Cd) sebesar 66,28% dari desain *existing*, mampu meningkatkan *velocity contour* (m/s) pada kecepatan 120 km/jam sebesar 17,89% dari desain *existing*, mampu mereduksi *pressure contour* (Pa) pada kecepatan 130 km/jam sebesar 0,52% dari desain *existing*, mampu meingkatkan *velocity magnitude* (*streamline*) pada kecepatan 120 km/jam sebesar 17,90% dari desain *existing*.

Kata kunci : Bagian depan lokomotif*, coefficient drag* (Cd), *velocity contour* (m/s), *pressure contour* (Pa), *velocity magnitude* (*streamline*), *existing*, optimasi, variasi kecepatan

ABSTRACT

This research discusses the analysis of the relationship between locomotive speed and the amount of air resistance that occurs on the CC 300 locomotive, one of the locomotives used in Indonesia today. Based on the results of this analysis, an alternative geometry option was created for the CC 300 locomotive. In the geometry option, changes were made to the front structure of the locomotive by increasing the radius value by 1000 mm and 300 mm at acute angles in order to reduce the amount of air resistance that occurs. The speed of the CC 300 locomotive in this study was varied from 120 km/h to a maximum design speed of 160 km/h in increments of 10 km/hour. Based on the simulation results, it shows that the greater the locomotive speed, the drag coefficient (Cd) value will tend to be constant. By changing the locomotive geometry, the results of the optimization design can reduce the drag coefficient (Cd) value significantly. At a speed of 140 km/h the drag coefficient (Cd) is 0.75138784 in the existing design and decreases to 0.45187151 in the optimization design. It was also found that the optimization design at a speed of 140 km/hour was able to reduce the drag coefficient (Cd) by 66.28% from the existing design, was able to increase the velocity contour (m/s) at a speed of 120 km/h by 17.89% from the existing design, able to reduce the pressure contour (Pa) at a speed of 130 km/h by 0.52% from the existing design, able to increase the velocity magnitude (streamline) at a speed of 120 km/h by 17.90% from the existing design.

Keywords : *Front of the locomotive, coefficient drag (Cd), velocity contour (m/s), pressure contour (Pa), velocity magnitude (streamline), existing, optimization, speed variations*