

INTISARI

Aerodinamika mobil merupakan bidang yang selalu dikembangkan sejak dahulu. Ilmu aerodinamika diterapkan pada mobil agar performa mobil meningkat. Sidepod adalah bagian *bodywork* pada bagian samping yang di dalamnya berisi sistem pendinginan dan sistem *exhaust*. Fungsi dari *sidepod* adalah mengarahkan aliran udara yang melewati mobil. *Sidepod* memberikan suplai udara bagi *radiator*, selain itu *sidepod* berguna untuk menambah *downforce* dari mobil.

Penelitian ini dilaksanakan melalui beberapa proses yaitu, desain model uji pengujian windtunnel, pengujian windtunnel, desain model simulasi, simulasi Computational Fluid Dynamic (CFD), dan membandingkan hasil pengujian windtunnel dan simulasi CFD. Pengujian windtunnel dan simulasi CFD dilakukan di Laboratorium Mekanika Fluida DTMI. Pengambilan data pengujian windtunnel sebanyak 100 data pada empat titik dan dilakukan analisis data velocity dan pressure dynamic. Penelitian ini dilakukan dengan mensimulasikan sidepod *Existing* dan variasi angle of attack pada airfoil sidepod. Simulasi CFD dilakukan dengan menggunakan *software* ANSYS Fluent 20 R1. Output dari simulasi CFD adalah nilai coefficient of lift, coefficient of drag, mass flow rate rate, dan total heat transfer rate yang selanjutnya dianalisis dan membandingkan variasi sidepod dengan sidepod *Existing*. Simulasi dijalankan dengan tiga variasi kecepatan yaitu, 6,5 m/s; 13 m/s; 19,5 m/s.

Desain sidepod dengan performa paling optimal secara aerodinamika terjadi pada desain sidepod B pada variasi kecepatan udara 19.5 m/s dengan nilai coefficient of lift sebesar -2.34 dan coefficient of drag sebesar 0.62. Akan tetapi, desain sidepod dengan performa paling optimal ditinjau dari perpindahan panas pada radiator terjadi pada sidepod desain A dengan nilai heat transfer rate sebesar 1191,656 watt pada variasi kecepatan 19.5 m/s

Kata kunci: Sidepod, CFD, Windtunnel, airfoil

ABSTRACT

Car aerodynamics is a field that has always been developed ever since the first car had been made. Aerodynamics is applied to cars to increase car performance. Sidepod is the bodywork on each side of car's body which contains the cooling system and exhaust system. The function of the sidepod is to redirect the flow of air through the car. The sidepod provides the air supply for the radiator, besides that the sidepod is also used to increase the downforce of the car.

This research had been done through several processes, in this case, windtunnel test model design, windtunnel testing, simulation model design, Computational Fluid Dynamic (CFD) simulation, and comparing the results of windtunnel testing and CFD simulation. Windtunnel testing and CFD simulation were done at the DTMI's Fluid Mechanics Laboratory. Data collected from windtunnel test was as much as 100 data at four different points and the raw data result, velocity and pressure dynamic data then analyzed through several methods above. This research was done by simulating the *Existing* sidepod and variations in angle of attack on the sidepod's airfoil. The CFD simulation was done by using the ANSYS Fluent 20 R1 *software*. The output of the CFD simulation is the value of coefficient of lift, coefficient of drag, mass flow rate rate, and total heat transfer rate, that analyzed and compared the sidepod's variations with *Existing* sidepods.

The design of sidepod with the most optimal aerodynamic performance occurred in the sidepod B design at 19.5 m/s air speed variation with -2.34 value of coefficient of lift and 0.62 value of coefficient of drag.

Keywords: Sidepod, CFD, Windtunnel, airfoil