

ABSTRACT

Fuel oil is a source of energy that is widely used both in Indonesia and the world. However, fuel oil is a natural resource that cannot be renewed. So that reserves in the earth decreases from year to year. Even the lack of fuel has become a problem in various countries including Indonesia. One of the major influences on fuel consumption is the weight of the vehicle. The heavier a vehicle will require a large amount of energy to move the vehicle. Part that has a significant effect on vehicle weight is the vehicle frame.

The yacaranda ethanol car frame is designed to realize energy efficient cars with a lightweight and strong frame. Using aluminum 6061 hollow square shape with a size of 2 x 1 inches and 3 mm thick the car frame will be designed using solidworks 2018. Then analyzed with solidworks simulation to take several parameters such as weight, volume, stress, displacement, and safety factors.

The test data displays the results of five designs made then analyzed using the finite element method. Stress analysis on the five designs showed the best test results on design 5 with a maximum stress value of 94,8 MPa while yield strength was 275 MPa. Failure occurred in design 2 because the maximum stress reached 305,9 MPa. The smallest displacement that occurs is 3,6 mm and the largest is 8,3 mm. The minimum factor of safety that occurs the smallest is 0,9 found in design 2 and the biggest 2,9 is in design 5. Some design variations will give consideration to choosing the best design that will be realized.

Keywords: *Vehicle frame, Finite Element Method (FEM), Static analysis*