ABSTRACT

The one of the hole automotive component that critical in this function is wheel. Wheel, its function is very important support the safety of the driver in driving a car. Moreover, the wheel has experienced another function, like, for example as an esthetics function. But, the wheel must fulfill some certain criteria before it’s manufactured in mass production. From each testing, the one of this testing is dynamic cornering fatigue, in accordance with SAE J328. In this testing we need a lot of power, time, and money. Considering of this, so, the wheel should being tested. This simulation is conducted with help the ANSYS software.

This study is learning about the use of finite element method in predicting fatigue life of automotive component that is an alluminium wheel. The analysis phase is consisting of finite element modeling, material properties definition, and loading conditions. Then, from this program execution it will be known the critical zone of this component and the magnitude of stress that occured. Base of the data of stress variants, we can formulated the time history of its. The next phase is predicting the cumulative damage of this wheel.

In this simulation there is a slightly different numerical result, if it compare to the minimum result of the standard testing. It is caused by for example we can’t perform this simulation like the actual physical problem precisely. Another factor that influence this simulation are the conditions that shorten its fatigue life, e.g., like surface finishing, stress concentration, etc, is not included in the simulation process. The cycle that’s reached in the simulation process is $2.8 \times 10^8$ at lateral loading and $4.4 \times 10^8$ at diagonal loading. This result is bigger than the minimum cycle that’s reached by the standard testing, 500,000. According to the modified Goodman diagram, the magnitude of stress that occur in the case of lateral and diagonal loading condition is far bellow the modified Goodman line. In according to the aim of the simulation process, that is, decreasing the iteration design cycle, so, we can conclude that this simulation process represent the standard testing process.

Keywords: fatigue life prediction, finite element method, fatigue failure, stress time history.