CHAPTER 3

RESEARCH METHODOLOGY

3.1 Overall Methodology

Methodology gives the brief idea to what the method that has been adopted throughout the project. The research methodology flowchart for this project was shown in figure 3.1. The literature review of the vehicle chassis was carried out to obtain basic understanding of the project. The Computer Aided Design (CAD) modeling was performed on the chassis model by using Catia software. Then, the modeled chassis was completely transformed into the finite element software for engineering analysis. The finite element torsional analysis were also performed. The objective of these tests were to find the torsion stiffness of the structure and the response of the applied load at different loading condition.

3.2 Process Flow Chart

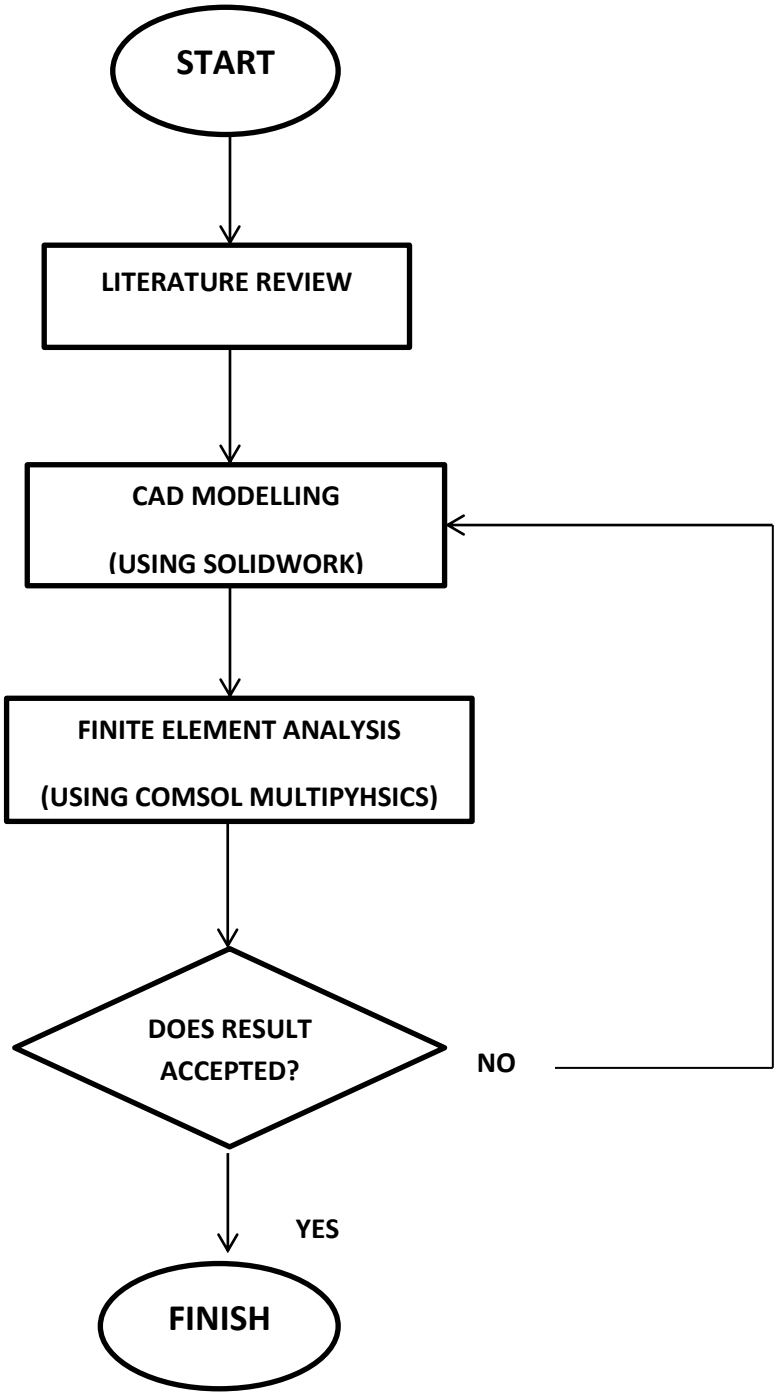

Figure 3.1

In this project, Finite Element Analysis was used to determine the characteristics of the chassis. For the purpose of this study, the chassis model was modeled using

Catia software. The model was then imported into a commercial Finite Element software (Comsol multipyhsics).

The chassis model was modeled using CAD software. The CAD model may need to be remodel if the results of FEA do not meet with the predetermined requirements. In this phase, all the required detailed engineering drawings for manufacturing prototype of the chassis model are prepared. The FEA will compromise structural analysis such as torsional stiffness and bending deflection simulations where the behaviors of the designed chassis model under different conditions are reviewed. The severity of any undesirable results will be assessed and any necessary modification on the design will be made accordingly.

3.3 Pre Processing Stage

The Solid Mechanics interface, through its equations, describes the motion and deformation of solid objects in a 2- or 3-dimensional spatial frame and positions in the frame are identified by lowercase spatial coordinate variables *x*, *y*, and *z*.

By default, the solid mechanics interface uses the calculated displacement and equation below to define the difference between spatial coordinates **x** and material coordinates **X**. This means the material coordinates relate to the original geometry, while the spatial coordinates are solution dependent. For example coordinate of element due to deformation.

$$x = x(X,t) = X + u(X,t)$$

Figure 3.2 : Equation 1.1