Design of two wheeler electric vehicle IGNITIA V1.0

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Abstract.

This study includes the virtual design of two wheeler electrical vehicle on CATIA V5 with consideration of advance comfort, trendy look, light weight and good mileage comparison with existing model. The study also includes the maximum weight loading analysis of the chassis material of EV IGNITIA V1.0 on Autodesk Inventor 2013 static force analysis

Keyword: CATIA V5 virtual design, Stress analysis, Ergonomics

1. Introduction

IGNITIA V1.0 is a two wheeler electric vehicle having fourbasic unit and i.e. transmission system, suspensions, breaking and chassis.

1.1 **Technical Specification** : Transmission: Hub derive Motor type: Brushless 750W/48V Dimensions: 1885x 655x 1040 mm, Wheelbase 1265mm Weight: 96 kg Controller: Programmable CPU Top speed: 40km/hr Battery: Lithium Ion 4 pack (4x12) 48V Wheel: Aluminum Braking system: Disk Brake Suspensions: Hydraulic Dampers, front and rear both Tires: Nylon, 16 inch diameter front and rear

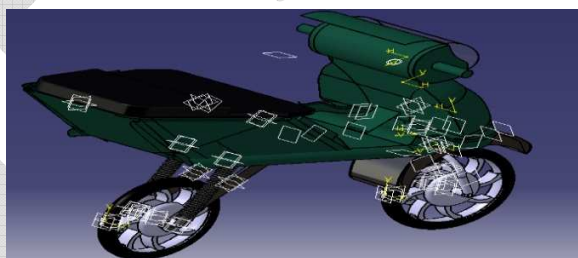1.2**.** Design Specification of Ignition V 1.0

Figure 1.1: CATIA V5 design image of the two wheeler EV IGNITIA V1.0, side view.[4]

Note: We design this vehicle virtually so all the technical specification is theoretical.
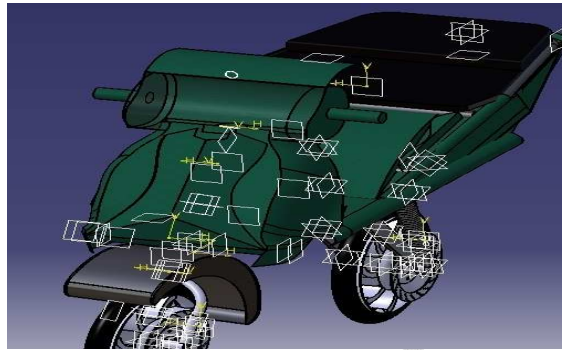
Figure 1.2: Catia Design Image of the two wheeler EV IGNITIA V1.0, front view

The designing procedure has been completed on CATIA V5 with all standards of market and customized properties [2] of the vehicle.

2. Frame Analysis

The frame is made up of "Mild Steel Grade S 303."The structure is normal struts type with uniform body structure. The joints are considered as welded with MIG welding process. The static load analysis is done on Autodesk Inventor Professional 2013 CAD Package [1], [5] with boundary conditions only. The testing completed on software was for min. and max. values of various loads and stress.

2.1 Considerations.

The constraint included in this are fixed type constraint with max.Degree of Freedom is 3 and min. is zero. The load has been considered static on the vehicle with maximum loading condition. It includes the total weight of the vehicle including driver, co-driver, luggage and self-body weight.The initial torque is also considered as rotational moment on fixed constraints [4], [5] of chassis and wheel.
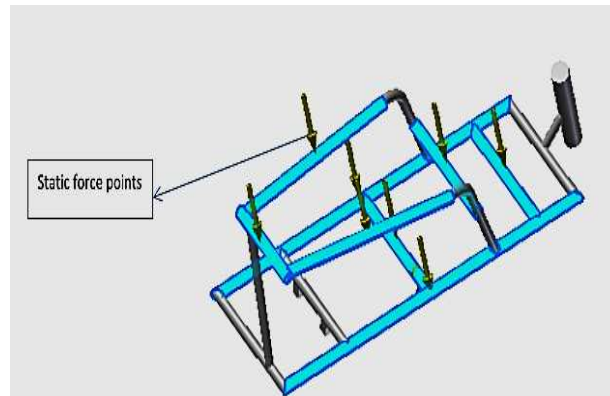
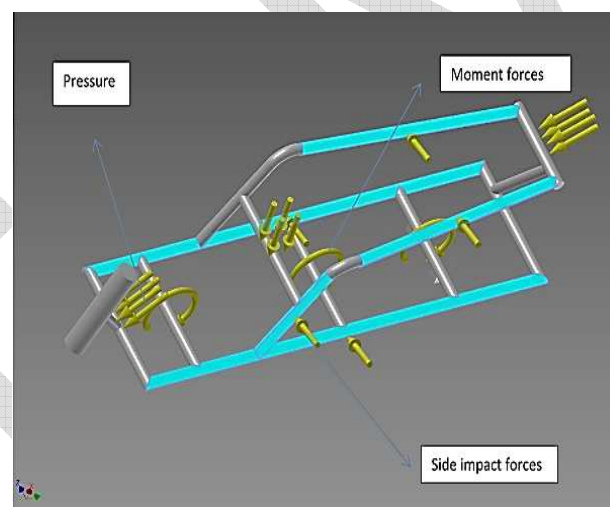Figure 2.1 Frame with Static Force Points and constraint

Figure 2.2 Frame with Pressure, Moment Forces and Side Impact Forces Points

2.2 Meshing : Tetrahedralmesh [3] is considered for the analysis of frame. Average element size (fraction of model diameter) is 0.1, minimum element size (fraction of average element size) is 0.2, grading factor is 1.5, and max. Turn angle is 60 degree. Total numbers of nodes are 21323 and elements are 11652. This stage of part design gives accuracy of more than 99.5 % regarding efficiency of it.These meshes are generated accordingly to the forces, loads and moments applied. These are the nodal points which give exact figure of stress analysis, factor of safety and fatigue analysis of the materials.
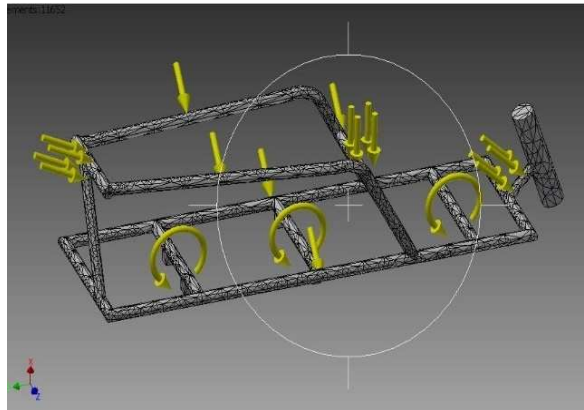
Figure 2.3: Tetrahedral Mesh frame

3. Simulation Data

After running the programthe following value tables are generated from the Autodesk inventor software which exactly gives us the value of maximum load and minimum load criteria for our design and ideal vehicle specification.