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MODELING AND STRUCTURAL ANALYSIS OF HEAVY VEHICLE CHASSIS FRAME

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ABSTRACT

Chassis is a French expression that was at first used to indicate the edge parts and Basic Structure of the vehicle. It is otherwise called spine of the vehicle. A vehicle without body is known as Chassis. The vehicle's segment like, Transmission System, Axles, Wheels and Tires, Suspension, Controlling Systems like Braking, Steering and so forth., and electrical framework parts are additionally mounted on the Chassis outline. It is the principle mounting for every one of the segments including the body and that is called as Carrying Unit. Primary segments of case are 1.Frame 2. Motor or power plant 3. Clutch 4.Gear box 5. propeller shaft 6. Differential 7.U-Joint.

Chassis frames are of three types1.Conventional outline 2.Integral frame 3. Semi indispensable frame.For the most part these edges are utilized for, to convey heap of the travelers or merchandise conveyed in the body, to bolster the heap of the body, motor, adapt box and so forth., to withstand the powers brought on because of the sudden braking or Acceleration, to withstand the stresses created because of the awful street condition, to withstand diffusive drive while cornering.

Due to these above loads chassis will fail or its shape will get deformed. In this project we are going to do designing of the chassis using CAD software Catia V5R20 and structural analysis for the existing material structural steel and aluminum alloy by using CAE software Ansys.

Because of these above Loads Chassis will fizzle or its shape will get twisted. In this venture we will do outlining of the Chassis utilizing CAD programming Catia V5R20 and structural analysis for the current material basic steel and aluminum composite by utilizing CAE programming Ansys.

I. INTRODUCTION

The Chassis is the principle structure of the cutting edge vehicle. Countless in squeezed steel outline frame a skeleton on which the engine, wheels, pivot congregations, transmission, steering mechanism, brakes, and suspension individuals are mounted. Amid the assembling procedure the body is adaptable dashed to the body. This mix of the body and chassis plays out an assortment of capacities. It assimilates the responses from the developments of the motor and pivot, gets the response strengths of the wheels in speeding up and braking,

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Absorbs aerodynamic wind forces and road shocks through the suspension, and absorbs the major energy of impact in the event of an accident.

II. LAYOUT OF CHASSIS AND ITS MAIN COMPONENTS

The fundamental parts of the Chassis are

1. Frame: it is comprised of long two individuals assembled side individuals bolted with the assistance of number of cross individuals.
2. Engine or Power plant: It gives the wellspring of force
3. Clutch: It connects with and separates the power from the motor flywheel to the transmission framework.
4. Gear box
5. U Joint
6. Propeller Shaft
7. Differential

2.1 Elements of the Chassis Frame

1. To convey heap of the travelers or products conveyed in the body.
2. To bolster the heap of the body, engine, gear box and so forth.,
3. To withstand the strengths created because of the sudden braking or speeding up
4. To withstand the burdens brought about because of the terrible street condition.
5. To withstand diffusive drive while cornering

2.2. Types of Chassis Frames

There are three types of frames

1. Conventional frame
2. Integral frame
3. Semi-integral frame

2.3 Introduction to CATIA

CATIA is a completely mechanization programming which relates with the mechanical field. It is graphical UI which is anything but difficult to learn furthermore the product is highlight based and parametric strong demonstrating. We can draw 2D and 3D models of a section and as needs be the gathering of the parts should be possible in it.

The shape or geometry of the model or gathering is needy upon the qualities which are alluded as requirements. Modules, for example, sketcher module used to outline 2D drawings, part plan module is utilized to outline the 3D models of geometry, and Assembly work configuration is utilized to collect the diverse parts which are attracted the part plan module. Kinematics is utilized to give the reproduction or movement to the part bodies which are planned and amassed to some degree and get together outline modules.

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2.4. Different modules used in CATIA

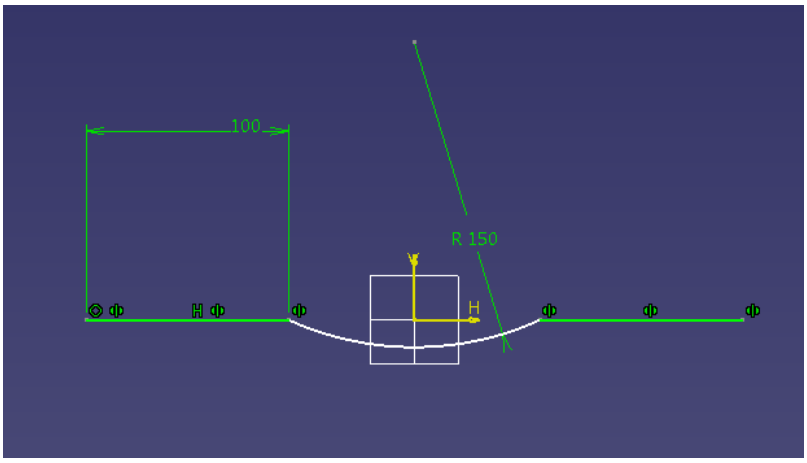
[1] Sketcher

[2] Part Design

[3] Assembly Design

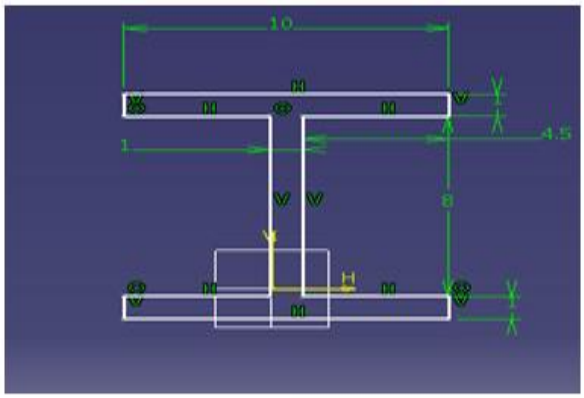
[4] Kinematics

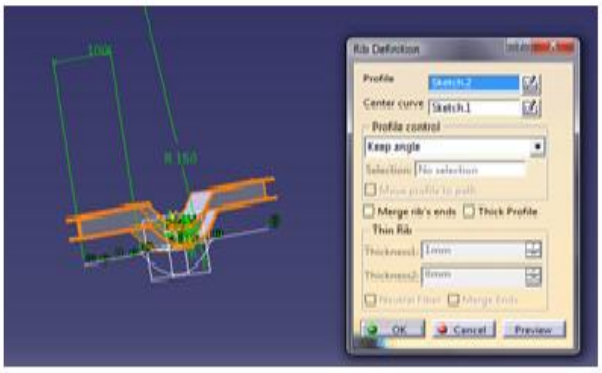
By Using the CATIA software the part designs were designed and assembly is made because compared to other software's CATIA is easy to design.

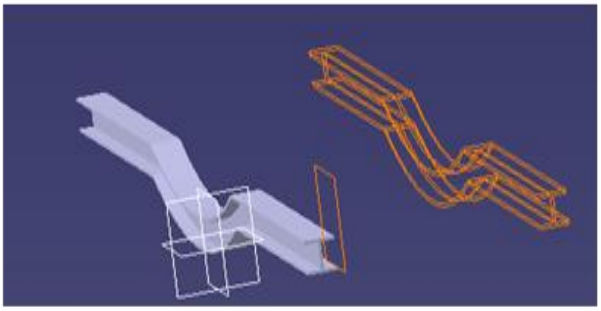


In sketcher we only draw the profile of the geometry. After drawing complete profile we need to check whether our profile is completely constrained or not.

2.5 Profile







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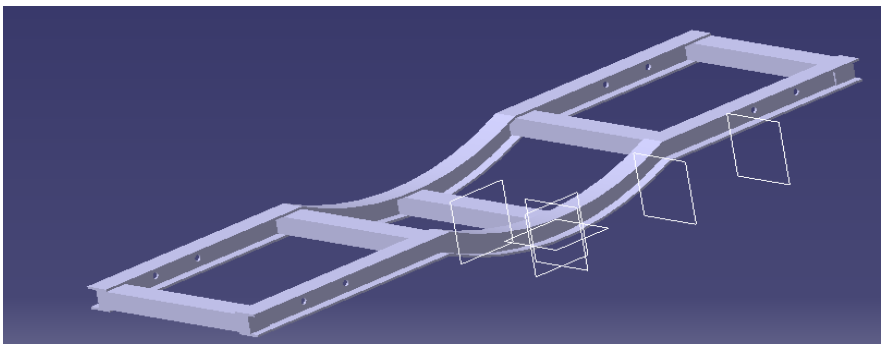
2.6 Complete Design of Chassis



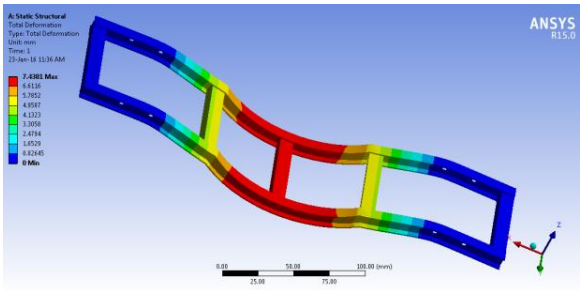
III. FINITE ELEMENT ANALYSIS (FEA)

The major thought in FEA is that the body or structure might be isolated into more diminutive parts of limited estimations called "Limited Elements". The first body or the structure is then considered as a variety of these segments related at a predetermined number of joints called "center points". Direct limits are approximated the expulsions over every constrained part. Such acknowledged limits are called "shape limits". This will connote the development inside the segments similar to the migration at the centers of the parts.

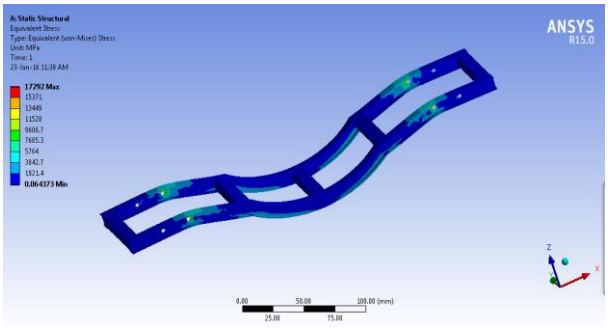
The Finite Element technique is a logical device for settling common and halfway differential examination in light of the reality it is a numerical apparatus, it can deal with the mind boggling issue that can be meant in differential scientific articulation from. The utilization of FEM is boundless as regards the game plan of rational outline issues. As a result of high cost of handling force of years cruised by, FEM has a background marked by being used to deal with complex and cost basic challenges.

Structural analysis of chassis

IV. TOTAL DIFORMATION



V. EQUIVALENT STREES



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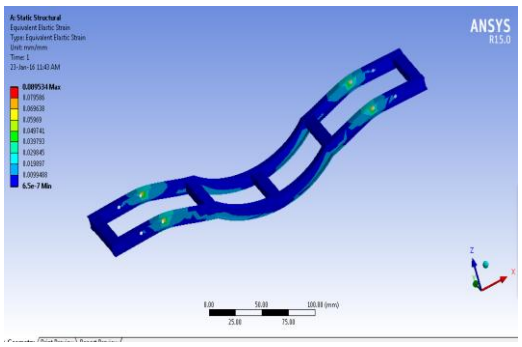
5.1 Equivalent Strain



5.2 Result

Material	Structural steel	Aluminum alloy
Total deformation	7.4381mm	21.043mm
Equivalent stress	17292mpa	16809mpa
Equivalent strain	0.089534	0.24541

VI. CONCLUSION

By this project we want to conclude that by using structural steel in place of aluminum alloy shows good physical bearable properties. Because the total deformation in the aluminum alloy greater than the structural steel so structural steel is good material for this design.

By this project we need to infer that by utilizing basic steel set up of aluminum compound shows great physical endurable properties. Since the aggregate twisting in the aluminum combination more noteworthy than the basic steel so auxiliary steel is great material for this design.

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