RESEARCH ARTICLE OPEN ACCESS

# Design and Analysis of a Heavy Vehicle Chassis for Optimum Load Conditions

[1]Harish Harsurkar, [2]J. Narsaiah, [3]S. Prashanth Raj
*[1&2]Assistant Professor, Department of Mechanical Engineering*
*[3]M.Tech Scholar, Department of Mechanical Engineering*
*[1&2&3]AVN Institute of Engineering and Technology, Hyderabad, India*
*Corresponding Author: Harish Harsurkar*

**ABSTRACT**: The composite cloth is a cloth composed of or more excellent stages and having bulk homes considerably great from the ones of any of the components. Different sorts of composite material are to be had and in fact, considered one of its far polymer matrix composites. It can be very well-known due to their low rate and smooth fabrication strategies. It has the advantages of immoderate tensile energy, excessive stiffness, and particular corrosion resistance and so on. A gift, this polymer matrix composite fabric is implemented in aerospace, vehicle industries because of its miles the immoderate energy to low weight ration. For cars, chassis includes an assembly of all the essential factors of a truck to be prepared for operation on the street. In our mission, format, and model the heavy vehicle chassis with the useful aid of the use of seasoned/engineer software program software, through taking the information from the l & t heavy car version by using the use of opposite engineering techniques. Presently used the material for chassis is metallic. The critical motive is to replace the chassis cloth with im 7 fiber & 997 epoxy.

**Keywords:** IM 7Fiber, 997 Epoxy, Heavy Vehicle Chassis, ANSYS.

---

Date Of Submission: 25-07-2019 Date Of Acceptance: 06-08-2019

---

## I. INTRODUCTION

The chassis paperwork the primary shape of the present day automobile. A massive variety of designs in pressed-metal body shape a skeleton on which the engine, wheels, axle assemblies, transmission, guidance mechanism, brakes, and suspension members are hooked up. During the producing technique the body is flexibly bolted to the chassis.

This combination of the frame and frame plays kind of capabilities. It absorbs the reactions from the actions of the engine and axle, gets there motion forces of the wheels in acceleration and braking, absorbs aerodynamic wind forces and avenue shocks through the suspension, and absorbs the vital strength of effect within the occasion of a coincidence.

There has been a gradual shift in cutting-edge small car designs. There has been a trend towards combining the chassis body and the body into a single structural detail. In this grouping, the metal body shell is strengthened with braces that make it rigid enough to face up to the forces which are probably carried out to it. To attain better noise-isolation traits, separate frames are used for other cars. The presence of heavier-gauge steel components in modern separate frame designs also has a bent to restrict intrusion in injuries.

## II. METHODOLOGY

Ladder chassis is taken into consideration to be one of the oldest sorts of automobile chassis this is nonetheless used by maximum of the SUVs until nowadays.

- As its call connotes, ladder chassis resembles a form of a ladder having two longitudinal rails inter related by means of several lateral and cross braces.• Easier to repair after accidents. This is vital for taxicabs, due to the fact damaged bolt-on fenders can be replaced.

With the cab returned to incomes popularity right now, whereas a uni frame could require straightening by means of paid specialists on a device luxurious to rent — with the cab laid up for restore longer.

**Figure 1. Ladder chassis**

- Grand-Am lets in tubular space body vehicles to update their uni body counterparts, because the vehicles can effortlessly be repaired with new clips.

## III. Results

**Table 1. Structural**

| | **High carbon steel** | **Im7 fiber** | **997 Epoxy** |
|---|---|---|---|
| **Deformation** | 0.48671 | 0.36683 | 0.67518 |
| **Stress** | 75.336 | 68.522 | 65.067 |
| **Strain** | 0.00032472 | 0.00025161 | 0.00045458 |

**Table 2. Modal Analysis**

| | | **High carbon steel** | **Im7 fiber** | **997 Epoxy** |
|---|---|---|---|---|
| **Mode 1** | **Deformation** | 11.6 | 24.719 | 26.247 |
| | **Frequency** | 282.63 | 665.47 | 502.8 |
| **Mode 2** | **Deformation** | 11.613 | 24.75 | 26.277 |
| | **Frequency** | 282.63 | 665.48 | 502.81 |
| **Mode 3** | **Deformation** | 9.7029 | 20.623 | 21.978 |
| | **Frequency** | 288.68 | 680.29 | 513.52 |

**Table 3. For 3 Layers Structural Analysis**

| | **High carbon steel** | **Im7 fiber** | **997 Epoxy** |
|---|---|---|---|
| **Deformation** | 3.3476 | 2.7751 | 4.8878 |
| **Stress** | 112.11 | 109.97 | 101.23 |
| **Strain** | 0.00049654 | 0.00041484 | 0.0007267 |

**Table 4.Model Analysis**

| | | **High carbon steel** | **Im7 fiber** | **997 Epoxy** |
|---|---|---|---|---|
| **Mode 1** | **Deformation** | 10.908 | 23.552 | 24.6992 |
| | **Frequency** | 56.499 | 133.69 | 100.52 |
| **Mode 2** | **Deformation** | 10.537 | 22.785 | 23.877 |
| | **Frequency** | 67.702 | 147.82 | 111.56 |
| **Mode 3** | **Deformation** | 10.39 | 22.193 | 23.544 |
| | **Frequency** | 70.522 | 165.96 | 125.48 |

**Table 5. For 5 Layers Structural Analysis**

| | **High carbon steel** | **Im7 fiber** | **997 Epoxy** |
|---|---|---|---|
| **Deformation** | 3.4153 | 2.7998 | 5.032 |
| **Stress** | 109.68 | 106.76 | 99.71 |
| **Strain** | 0.00047017 | 0.00038594 | 0.00069272 |

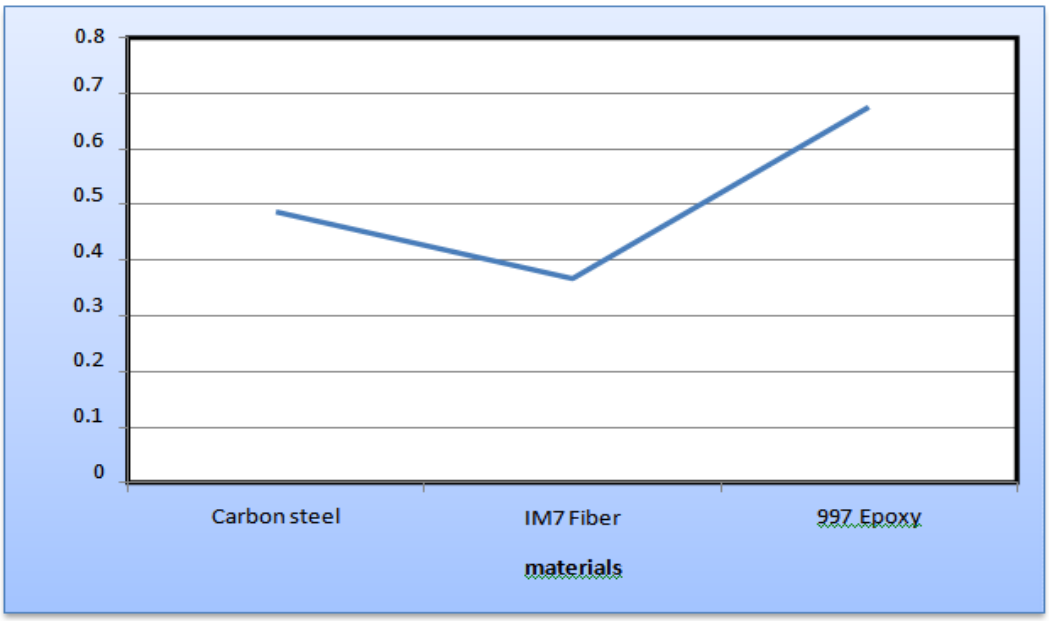


**Figure 2. Deformation Plot**

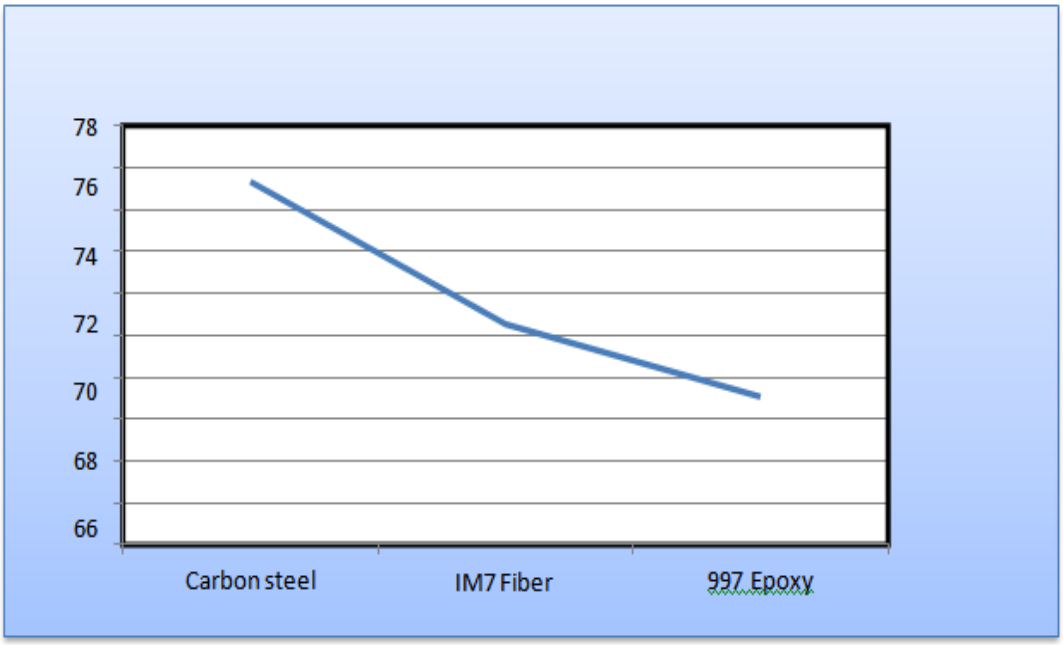


**Figure 3. Stress Plot**

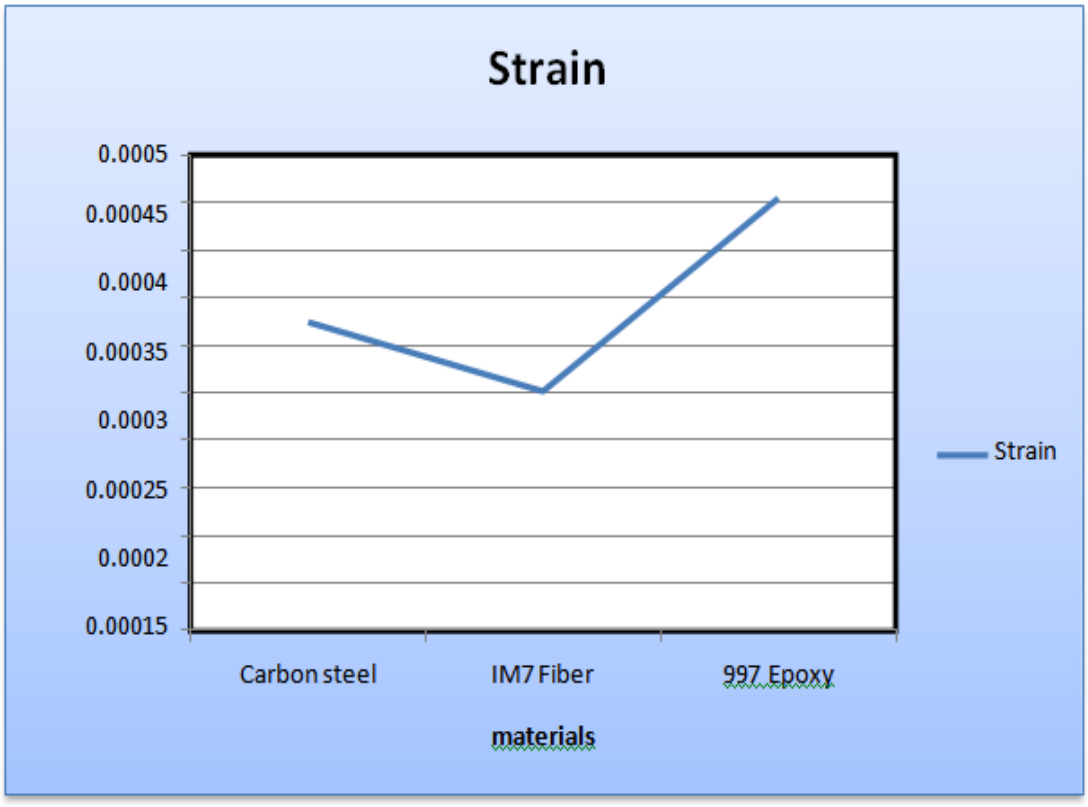


**Figure 4. Strain Plot**

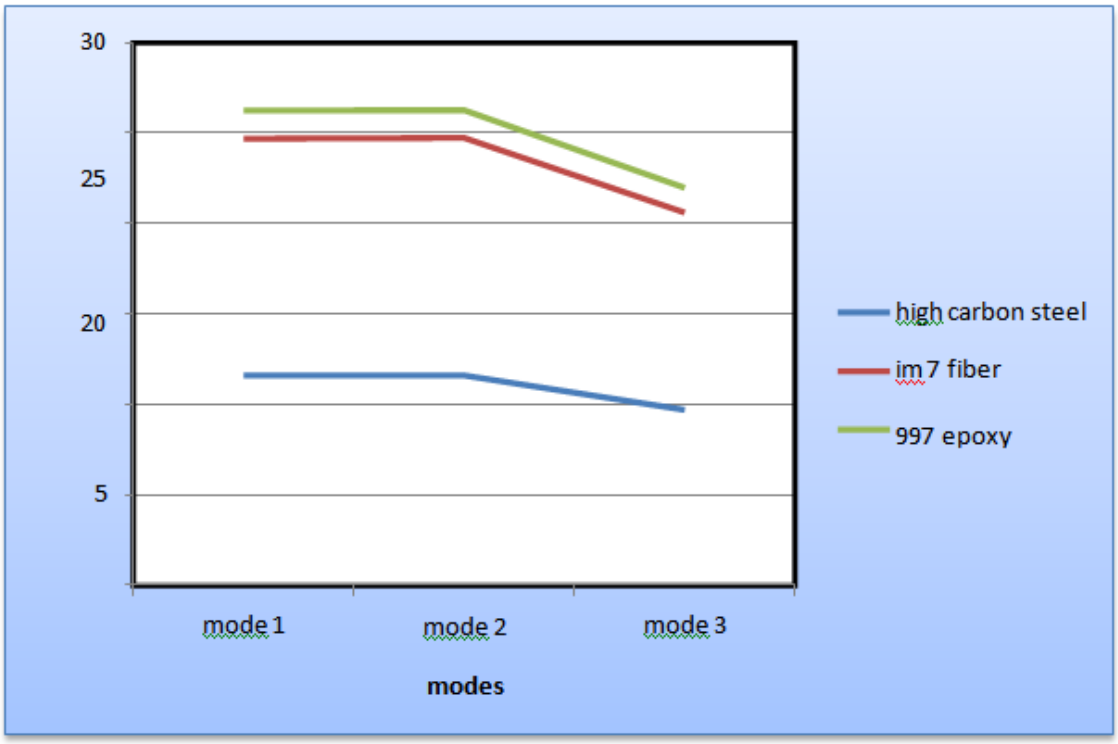


**Figure 5. Model analysis of deformation**

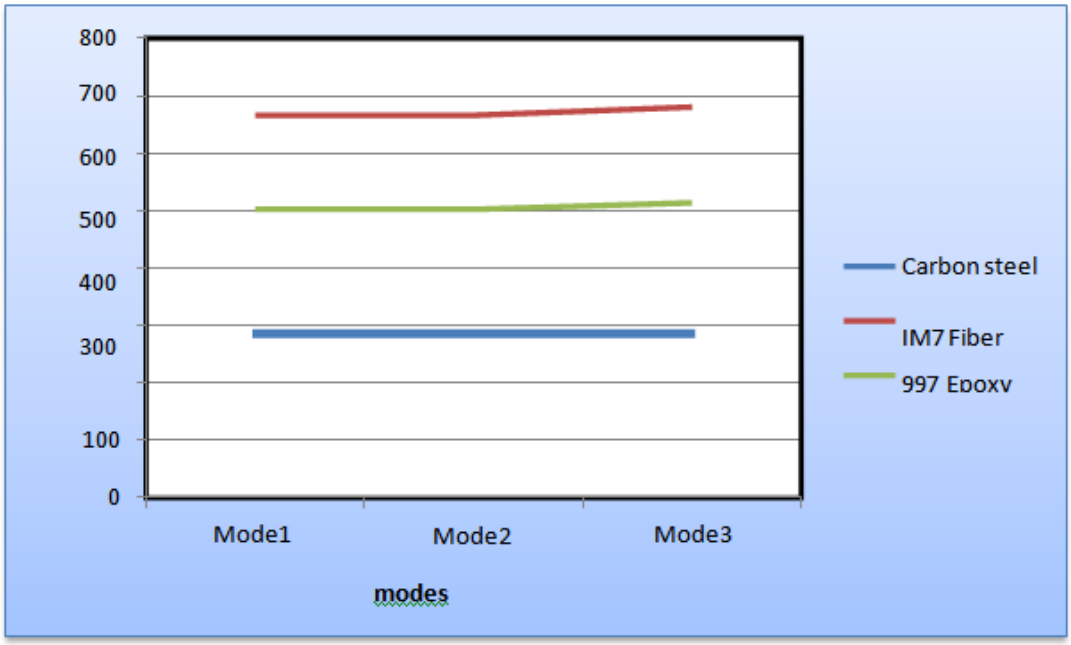


**Figure 6. Frequency plot**

## IV. CONCLUSION

Presently metal is used for chassis. In this task it's miles changed with the use of materials IM7 Fiber and 997 Epoxy. Structural and Modal analysis is achieved on the chassis for stable and the usage of layer stacking approach.

## REFERRNCES

[1]. NitinTenguriaet.Al."Design and Finite Element Analysis of Horizontal Axis Wind Turbine blade" International Journal of Applied Engineering Research, Dindigul Volume 1, No 3, 2010 ISSN 09764259.

[2]. Mr.V. DíazCasás, et.Al. "Automatic Design and Optimization of Wind Turbine Blades" International Conference on Computational Intelligence for Modelling Control and Automation, and International Conference on Intelligent Agents, Web Technologies and Internet Commerce 0-7695- 2731- zero/06, IEEE.

[3]. Harish Harsurkar,G. Srikanth Reddy, Sharanagouda Hadimani, Shravankumar, "Design and Analysis of Go Kart Chassis for High Strength and Durability", International Journal of Engineering Science Invention (IJESI) ISSN (Online): 2319 – 6734, ISSN (Print): 2319 – 6726 www.ijesi.org , Volume 7 Issue 5 Ver VI, May 2018, PP 50-54.

[4]. Arvind Singh Rathore et al., "Design and Analysis of Horizontal Axis Wind Turbine Rotor"., International Journal of Engineering Science and Technology (IJEST) Vol. Three No.Martinmas 2011 ISSN : 0975-5462.

[5]. Sairam Kotari, V.Gopinath,"Static and dynamic analysis on Tatra chassis" International Journal of Modern Engineering Research (IJMER), Vol.2, Issue.1, pp-086-094. [7] K.W. Poh, P.H. Dayawansa, A.W. Dickerson, I.R. Thomas, Steel membrane floors for our bodies of massive rear- promote off mining cars, Finite Elements in Analysis and Design 32, (1999), 141-161.

Harish Harsurkar" Design and Analysis of a Heavy Vehicle Chassis for Optimum Load Conditions" International Journal of Engineering Research and Applications (IJERA), Vol. 09, No.08, 2019, pp. 66-70