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Modeling and Analysis on a Frameless Chassis Construction of Volvo Bus for Variable Velocities

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ABSTRACT: In this project, we reduce the impact by modifying the existing design. Data is collected from Body Shop. steel is the material which is majorly used for the construction of the chassis. Project aim is to analyze the frameless chassis with the currently used material steel and replacing it with better and well composite materials like Carbon epoxy, E-glass epoxy. Impact analysis is performed on the chassis for different speeds by varying the speed

materials. We carry out the analyzes for the existing design and for the modified design. The best result what we will consider the construction of the chassis. We are also going to reduce the weight of the chassis by using composite replacing materials with steels Software used for CREO modeling and for COSMOS analysis.

KEYWORDS: chassis, creo, velocities, variable materials.

I. INTRODUCTION

The chassis is the main structure that with holds all the weight of modernity automobile. A large number of forged and pressed steel versions the frame forms the skeleton on which the engine, are mounted assemblies, gearbox, steering mechanism, brakes, and suspension members are mounted. During manufacturing process, the body which is flexibly screwed to chassis. This body and frame combination performs a various function. Absorbs reactions and shocks from engine and axle movements, receives the reaction absorbs wheel forces during acceleration and braking aerodynamic wind forces and road vibrations suspension and absorbs the main impact energy when the vehicles in accident.

STRUCTURE OF BUSES

Only in the early years of bus body design, flexible the truck chassis was used together with the non-structural body elements of wood and canvas that led to the actual chassis design as opposed to integral body design. Today, even if a chassis is used together with the channel beam properly designed floor cross members, side wall and roof structure is achieved fully integral construction. The advantage of the channel beam bus chassis is simplicity designer, fully equipped mobile vehicle, heavy traffic suspension and robust load-bearing members. The the body of the bus as a whole is a light, solid structure however, a significant distortion of the overall stiffness occurs at doors and other large openings Slip the deformation at the door is up to 10 times greater than for comparable side parts. Most bus bodies on the European continent are fully welded tubular steels structures with similar stiffness properties. However, there are differences in the local design of the weld joints with regard to dimensions, shape and use additional reinforcements.

TYPES OF AUTOMOBILE CHASSIS

Motorcycle chassis: An important type of car chassis, motorcycle chassis consists of various car parts and components such as car frame, wheels, two-wheeler brakes and suspension. It's basically a motorcycle frame, isn't it holds these components together. Motorcycle chassis can be made from different materials. But commonly used materials are steel, aluminum

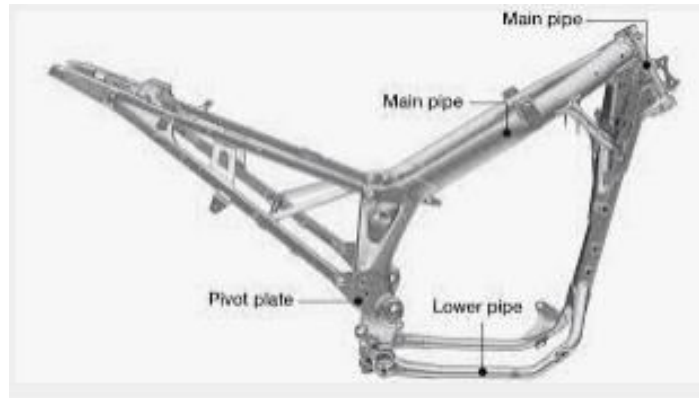


Fig1 show the chassis of motorcycle

Car chassis:

The main structure of a car is known as the chassis. Car the chassis acts as a support for various automotive parts. Automotive parts such as engine, suspension and steering mechanism, brake system, automatic wheels, axle assemblies and transmission are mounted on the car chassis.



Fig2 show the chassis of car

Bus chassis:

The bus chassis is the design and quality of the bus chassis it depends on the capacity of the bus. Can be custom made as needed and can be used with functions like transverse engine, air suspension ditto stabilizers. The well-made chassis of the bus offers various benefits such as high torque from low revs, excellent braking performance and more. Bus chassis intended for urban routes are different from those made for suburban routes.

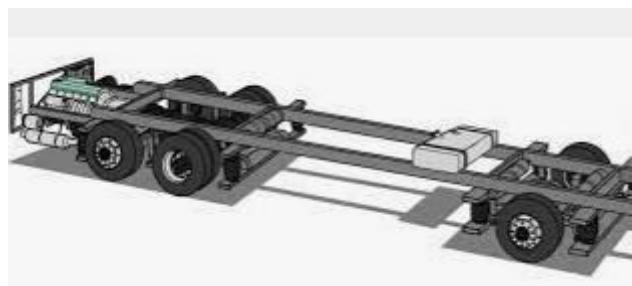


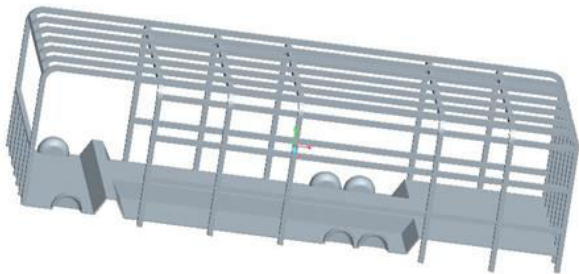
Fig3 show the chassis of bus



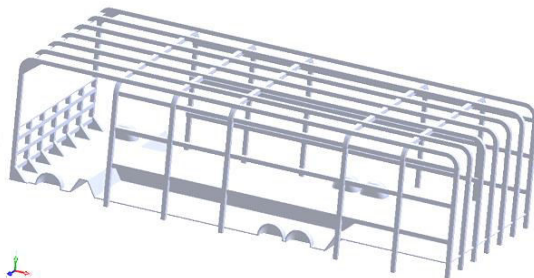
Computer-aided design (CAD) is the use of a computer systems (or workstations) that help create, design modification, analysis or optimization. CAD software is used to increase productivity designer, improve design quality, improve communication through documentation and create a database for production. CAD output is often in the form of electronic files for printing, processing or otherwise manufacturing process. Its use in designing electronic systems is well known as electronic design automation or EDA. In mechanical the design is known as mechanical design automation (MDA) or computer assisted drawing (CAD), which includes the process of creation technical drawing using computer software. CAD software for engineering design uses either vector graphics to represent traditional objects drawing, or it can also produce a raster graphics display overall appearance of the designed subjects. However, it involves more than just shapes. Same as in manual preparation of technical and engineering drawings, the output must convey information, e.g such as materials, processes, dimensions and tolerances, according to application-specific conventions.

it's a 3D modeling software used in engineering, design, manufacture and CAD drafting service companies. It was one of the first 3D CAD modeling applications that used a rule-based parametric system. Using parameters, dimensions, and functions to capture product behavior, can optimize development the product and the design itself. it is changed in 2010 from Pro/ENGINEER Wildfire to CREO. It was announced by the company who developed it, Parametric Technology Company (PTC), during the launch of its suite of designer products which includes applications such as assembly modeling, 2D orthographic views for technical drawing, final element analysis and more.

II. RESULTS AND CONCLUSION

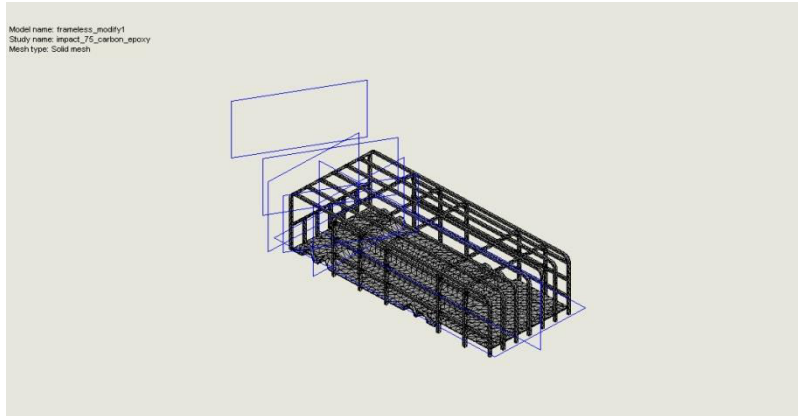


EXISTING MODEL



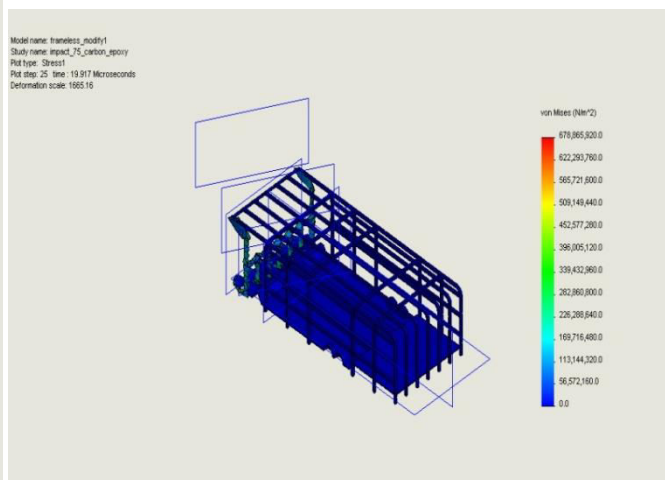
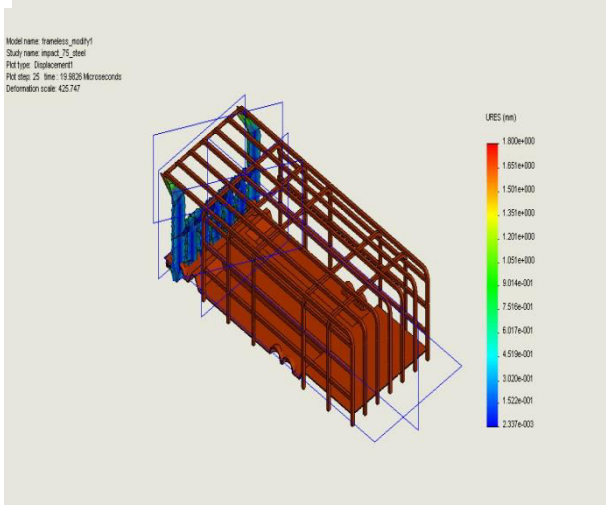
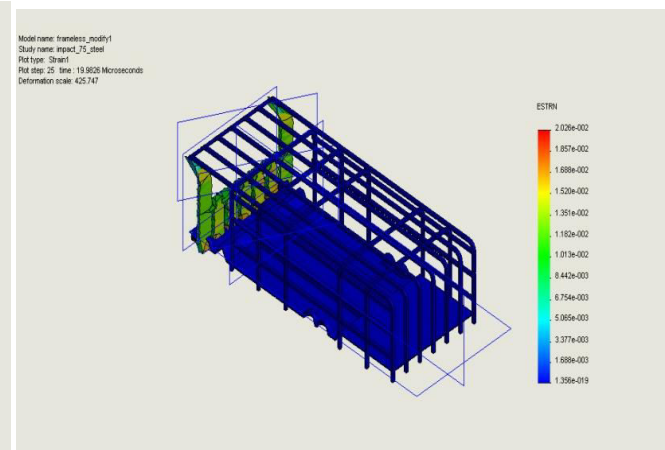
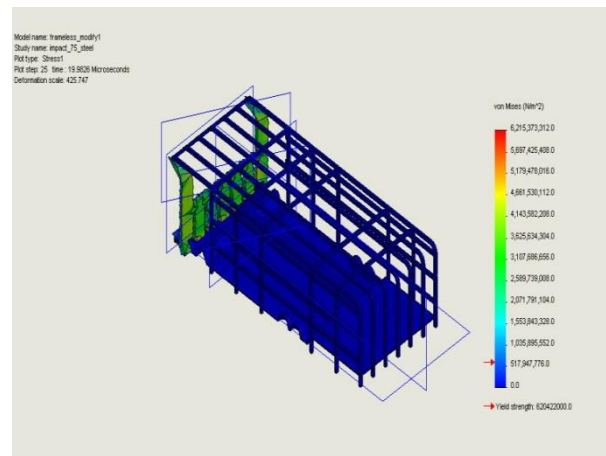
MODIFIED MODEL

The impact analysis was carried out at 3 different speeds that is 65,140 and 200 kmph with both the models.



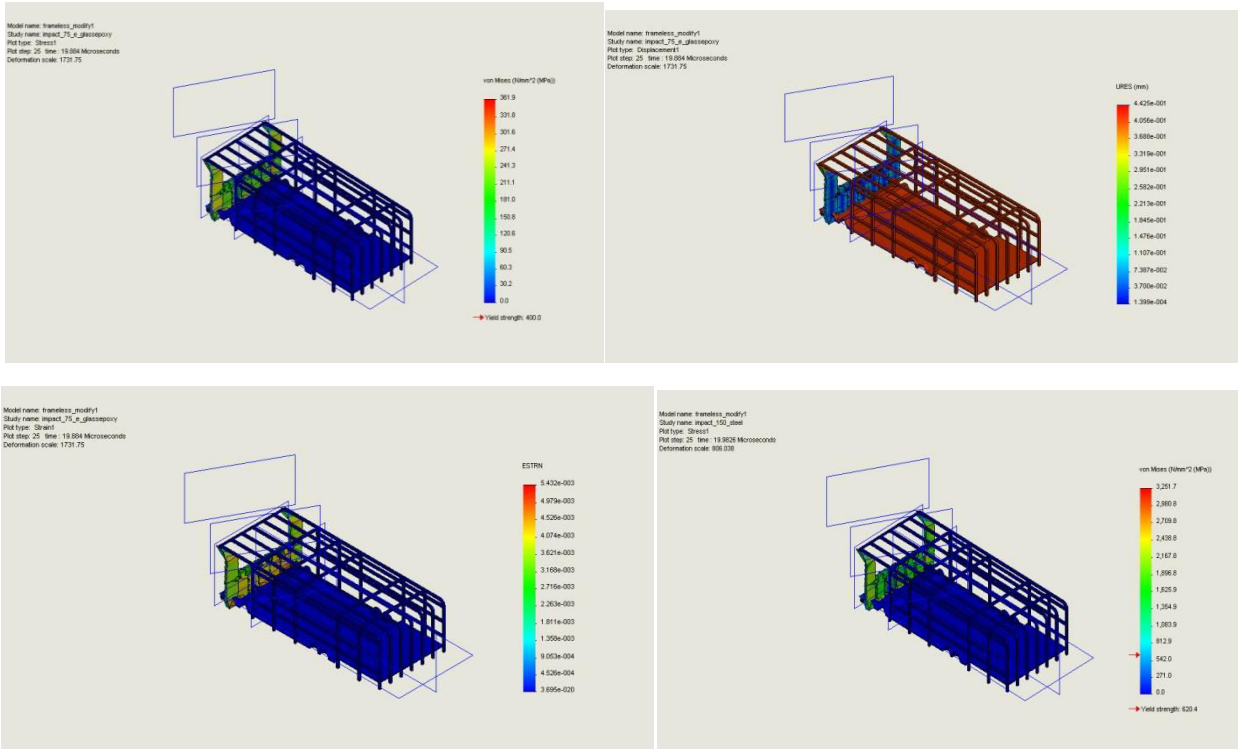
Meshing results

At 65kmph

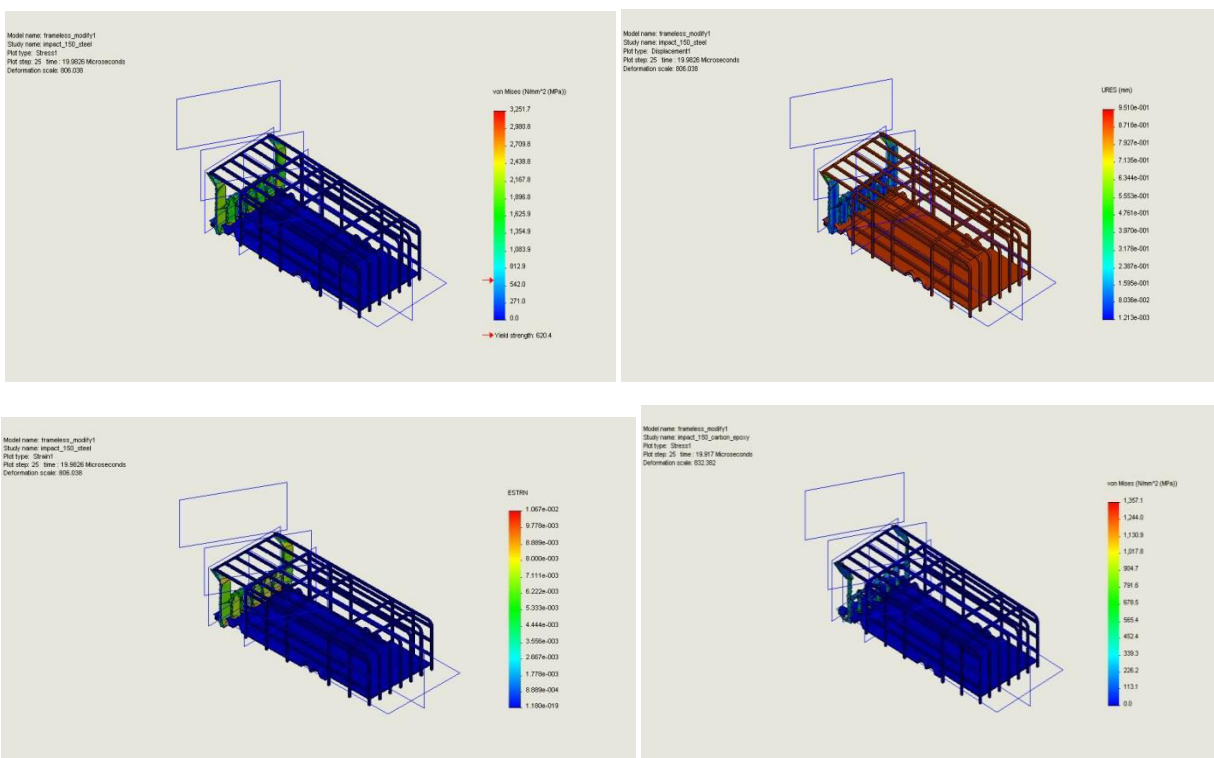




2nd model

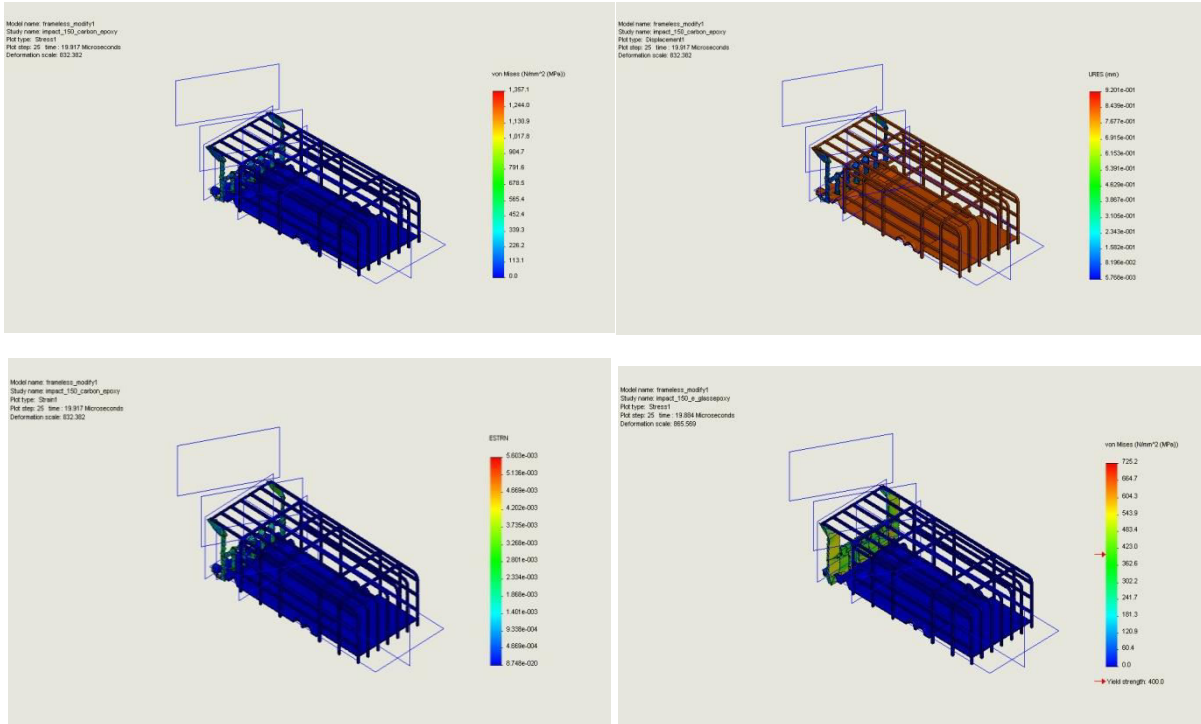


At 140 kmph

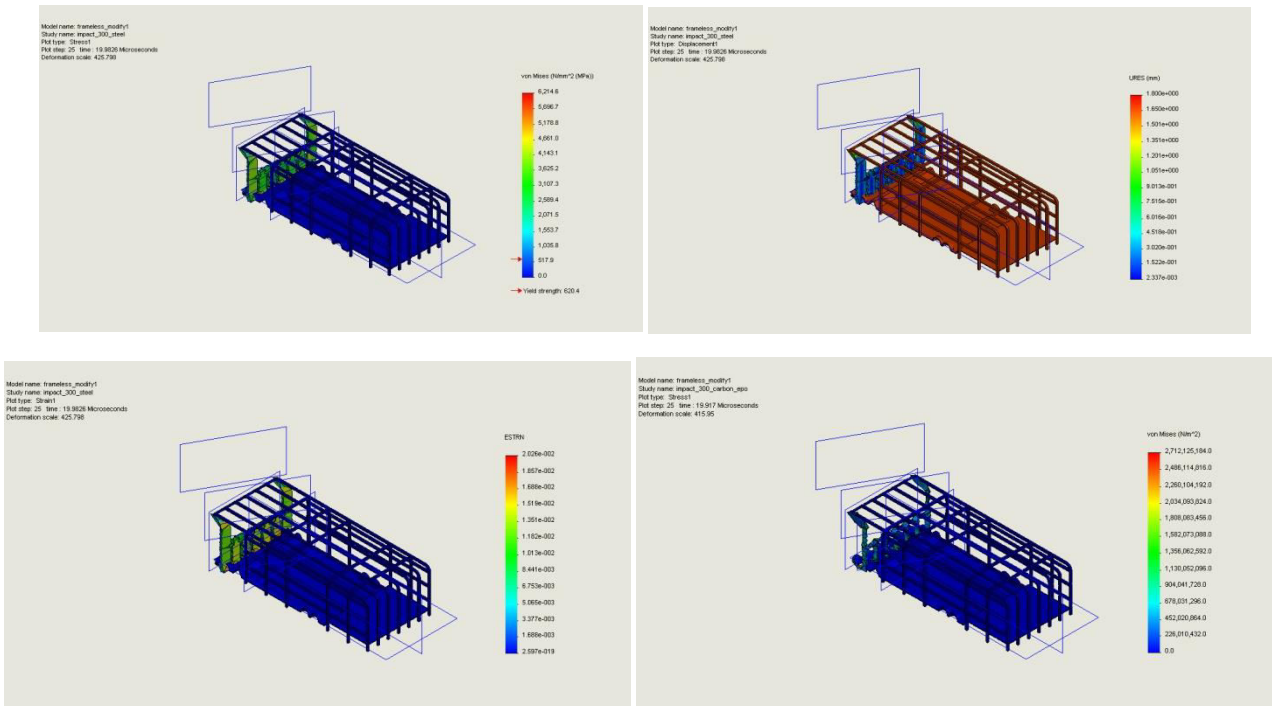




2nd model

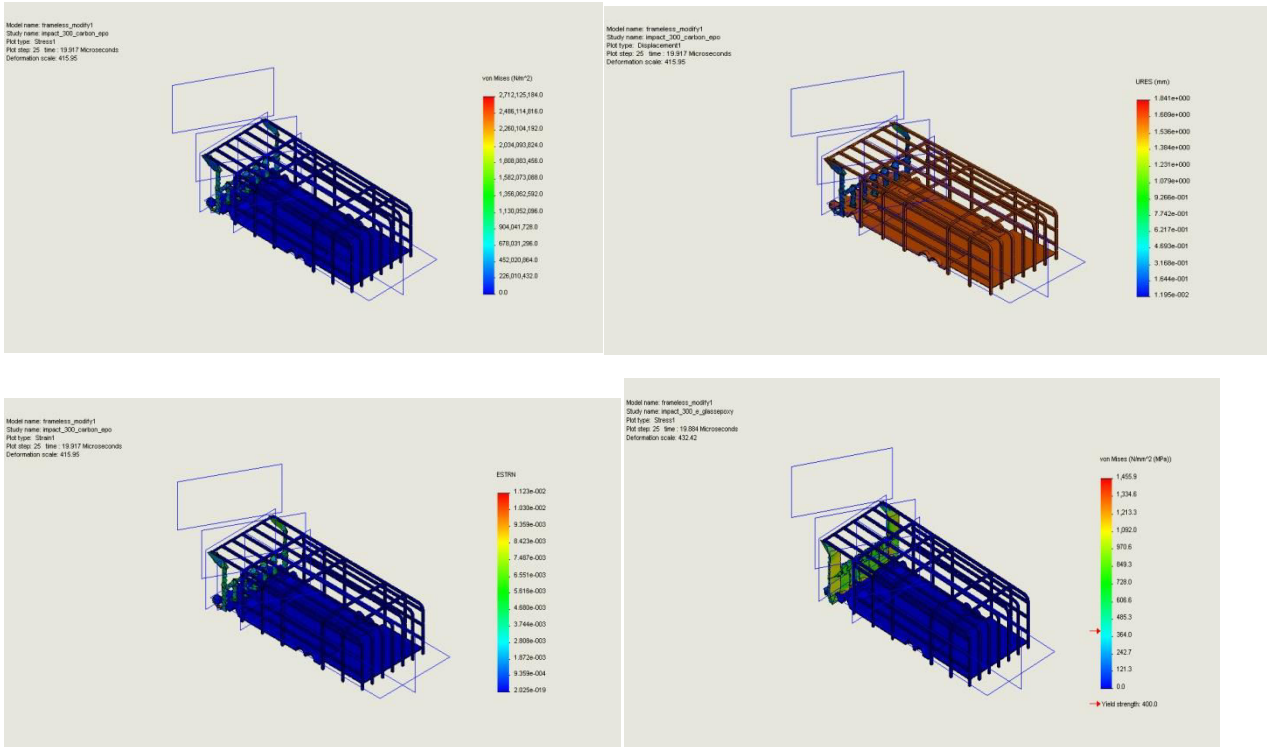


At 200kmph





2nd model



III. CONCLUSION

In the present analysis project, we have gathered the information of the Volvo bus and its feature specifications from the well-known workshop by understanding the physical as well as the loading boundary conditions. The current existing material of Volvo frameless chassis was steel. And we replaced that with the composite materials Carbon Epoxy and E – Glass Epoxy.

Impact analysis is carried on the chassis at different velocities i.e 85km/hr, 140 km/hr and 200 km/hr. By observing the results, the displacement and stress values are less compared to E – Glass epoxy than Steel and Carbon Epoxy.

We modified the design of frameless chassis by adding ribs at the top and bottom at the front side of the chassis.in this case the strength of the chassis when it experiences the sudden loads. By the modified design the displacement and stress values are reduced than the present design.

So from the above projected results E – Glass epoxy is better material for frameless chassis and by modifying the design the strength to weight ratio was good and the weight of the chassis is reduced by times of its actual

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