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DESIGN & ANALYSIS OF CABIN MOUNTING BRACKET FOR HEAVY VEHICLE

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ABSTRACT - Automobile sector is one of the largest branch of mechanical engineering industry. It consumes a lot of fuel transporting goods and people from one place to other by road. Reducing automobile weight for better economy is the challenge industry faces right now.The design and weight optimisation of the HCV truck's cab mounting are the main goal of the project.However, the researchers place relatively little emphasis on comparing optimis ation strategies to determine which one is optimal for the cabin mounting bracket.Finding th e optimal optimisation method for the weight optimisation of the Cab mounting will be the main focus of the study.The goals of this study will be to design the HCV truck's cab mounti ng accordance with the space constraints that are present, optimise the design of the cab mo unting using various optimisation techniques, and then manufacture and test the best design.

Keywords: Automobile, self-propelled vehicle, transportation of goods and passengers Chassis,frame, Chasis Design, Cabin Mounting

I. INTRODUCTION

An automobile is a selfpropelled vehicle that transports both passengers and cargo.In general, the two main assemblies that make up motor vehiclesboth trucks and passenger carsare regard ed as being the body and chassis.A vehicle's chassis is its frame or basic structure.components needed to move the vehicle forward are housed in the chassis.The body of the car is its main s tructure.The chassis is fastened to the body.The body and chassis together make up the entire vehicle.The vehicle is made up of various assemblies that work together seamlessly.The cabin is where the driver and codriver are sitting, despite the fact that it contains numerous other cru cial components.Their weight will be mostly on the floor, which must support heavy loads fro m all directions. Driver seated without any vibrations and distractions. A flat sheet of thin material such as the floor panel is very flexible for out-of-plane loads. The aim of the floor is to carry the local applied loads from their point of application to the major structural components of thevehicle, such as the side frames. Floors are subject to loads normal to their plane. Under such circumstances they do not act as simple structural surfaces. The floor is

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stiffened against out-of-plane loads by added beam members arranged into a planar framework. The advantages of tilting cabin over rigid cabin is easy for servicing, less weight, easy for design modifications and provide less vibrations. [6]

Growing competition in automotive market makes it more and more necessary to reduce the development time and cost of the product development process. One of the most costly phases in the vehicle development process is the field durability test and high expenses for this phase can be attributed to the number of prototypes used and time/efforts needed for its execution.

II. LITERATURE

Automobiles trucking market is most flactuating market these days, All big companies are launching new trucks or tippers every month or quarter, With the launch of every new models, new automobile spare part's demand comes in market. We are at the aim to provide all new generation trucking solutions to our customers. Some brief of our tipper/truck spare parts range includes Torque Rod Bushes, Bolster Mountings, Engine Mountings, Balance Rod Bushes, Amw, Bharatbenz, Tata Prima, Leyland, Mahindra Navistar, Man, Volvo, Eicher Volvo Truck Spare Parts etc. Our timely delivery and surveillance over quality control is our backbone to success. All time availability and serving the odd spare parts for new generation trucks is our formula of business. Automobiles trucking market is most flactuating market these days, All big companies are launching new trucks or tippers every month or quarter, With the launch of every new models, new automobile spare part's demand comes in market. We are at the aim to provide all new generation trucking solutions to our customers. Some brief of our tipper/truck spare parts range includes Torque Rod Bushes, Bolster Mountings, Engine Mountings, Balance Rod Bushes, Amw, Bharatbenz, Tata Prima, Leyland, Mahindra Navistar, Man, Volvo, Eicher Volvo Truck Spare Parts etc. Our timely delivery and surveillance over quality control is our backbone to success. All time availability and serving the odd spare parts for new generation trucks is our formula of business. Automobiles trucking market is most flactuating market these days, All big companies are launching new trucks or tippers every month or quarter, With the launch of every new models, new automobile spare part's demand comes in market. We are at the aim to provide all new generation trucking solutions to our customers. Some brief of our tipper/truck spare parts range includes Torque Rod Bushes, Bolster Mountings, Engine Mountings, Balance Rod Bushes, Amw, Bharatbenz, Tata Prima, Leyland, Mahindra Navistar, Man, Volvo, Eicher Volvo Truck Spare Parts etc. Our timely delivery and surveillance over quality control is our backbone to success. All time availability and serving the odd spare parts for new generation trucks is our formula of business. Automobiles trucking market is most flactuating market these days, All big companies are launching new trucks or tippers every month or quarter, With the launch of every new models, new automobile spare part's demand comes in market. We are at the aim to provide all new generation trucking solutions to our customers. Some brief of our tipper/truck spare parts

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III. STUDIES AND FINDINGS

1.1 STRUCTURAL ARRANGEMENT OF TRUCK

In contrast to private cars where a structural part is the body frame, by trucks performs chassis this function. All mechanism which allows ride and manipulation of trucks are its components. Some parts of undercarriage have to assign further function.

1.1.1 Anti-vibrations mounting:

The cabin is placed on 4 anti-vibration mountings. They are bolting to brackets. Since used bracket is frameless as anti-vibration mountings are fixed to casts. The anti-vibration mounting is usable for flexible conjunction of two structural elements. It is made from an outer casing which is made most often from structural steel. The attachment of anti-vibration mounting is made from screw joint. The screw crosses through an internal pipe of mount and the tightening torque of the screw is 80

– 100 Nm. A space between the outer casing and the internal pipe is filled by rubber. Rubber is vulcanization on the outer casing and the internal pipe. Between the internal pipe of anti-vibration mounting and the connected structural there are inserted washers even.

1.2 DETERMINATION OF POWERS IMPACTING ON ANTIVIBRATION MOUNTING

During static tests of anti-vibration mountings is necessary to know a real work loading of tractor cabin. For this purpose it was getting over a measurement. The measurement was done on exhaustively assemble cabin without air-conditioning. [7]

Before beginning of measure it was dismantled front and back anti-vibration mountings. During measurement it was used couple of tensiometric sensors which have been placed instead of anti-vibration mountings and it was measured on them power impacting from the cabin. First it was done the measurement at place of the front anti-vibration mountings attachment. Back part was supported at the location which is answered to real imposition on anti-vibration mountings. Analogically it was done the measurement of back anti-vibration mountings.

1.3 LOAD DISTRIBUTION IN FLOOR MEMBERS

Point loads, such as passenger seat reactions, are usually fed straight into local, probably minor, beam members. Distributed payloads frequently rest on the floor panel itself, which will need local reinforcement like swages. The local load is carried along the swages to adjacent beam members. The local members will transfer larger members (such as the transmission/services tunnel) and so forth until it reaches the side frame. The progression of the loads through the structure follows the pattern shown below. [2]

- Load gathering in floor
- Swages
- Minor Beams
- Major Beams
- Side Frames

1.4 FORCES ACTING ON TRUCK CAB

The vehicle designer needs to know the most damaging loads to which the structure is likely subjected. If the structure can resist the worst possible loading which can be encountered then it is likely to have sufficient fatigue strength.

1. Vertical symmetrical (bending case) cause bending about Y – Y axis.
2. Vertical asymmetric (torsion case) cause torsion about the X – X axis and bending about Y – Y axis.
3. Fore and aft loads (braking, acceleration, obstacles, towing).
4. Lateral (cornering, nudging kerb).
5. Local load case, e.g. door slams etc.
6. Crash cases. In real life many of the loads will occur in combination with each other. For example the weight is always present, so that the longitudinal and lateral cases are always accompanied. On the road, almost any combination of the pure cases can be encountered. For example, a cornering vehicle might encounter a bump (or pot hole) with one wheel. This could involve the extreme vertical asymmetric load case plus the extreme factored longitudinal bump case plus the cornering case and possibility also the braking case.

IV. ANALYSIS

The Structural analysis is done to find the Total Deformation and Equivalent von-mises stress in Cab mounting bracket after the application of constraint on it. The results of analysis is shown below.

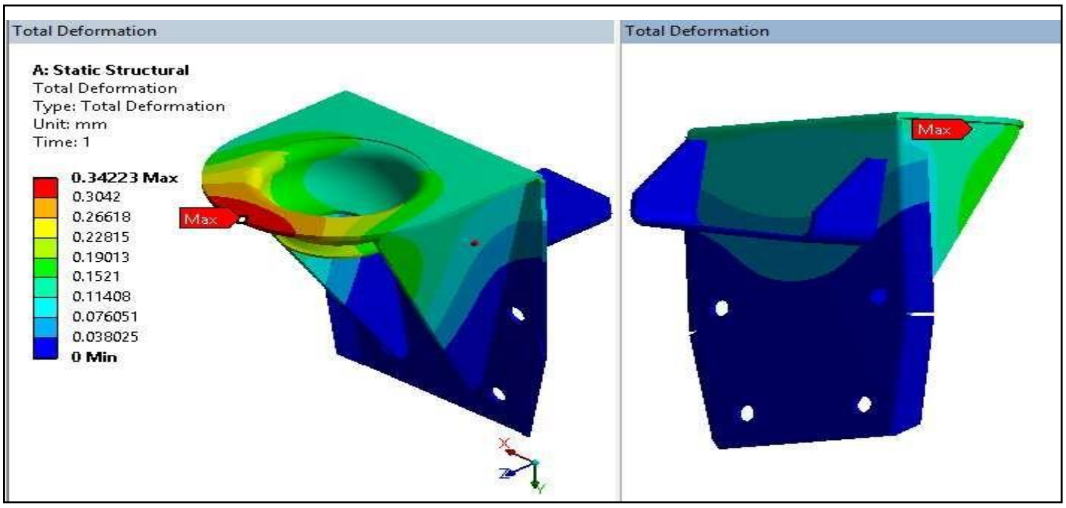

Fig. 1 : Total deformation

The maximum deformation observed is only 0.342232mm which is very less.

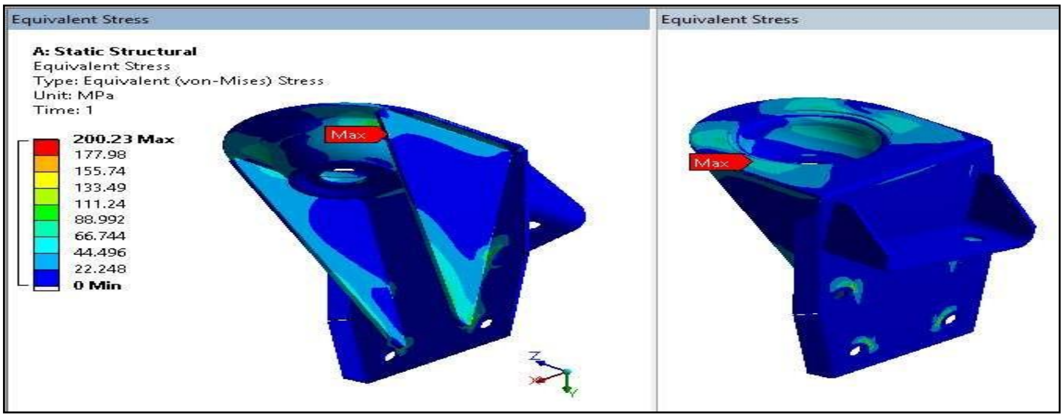

Fig. 2: Equivalent Stress Original Cabin Mounting Bracket

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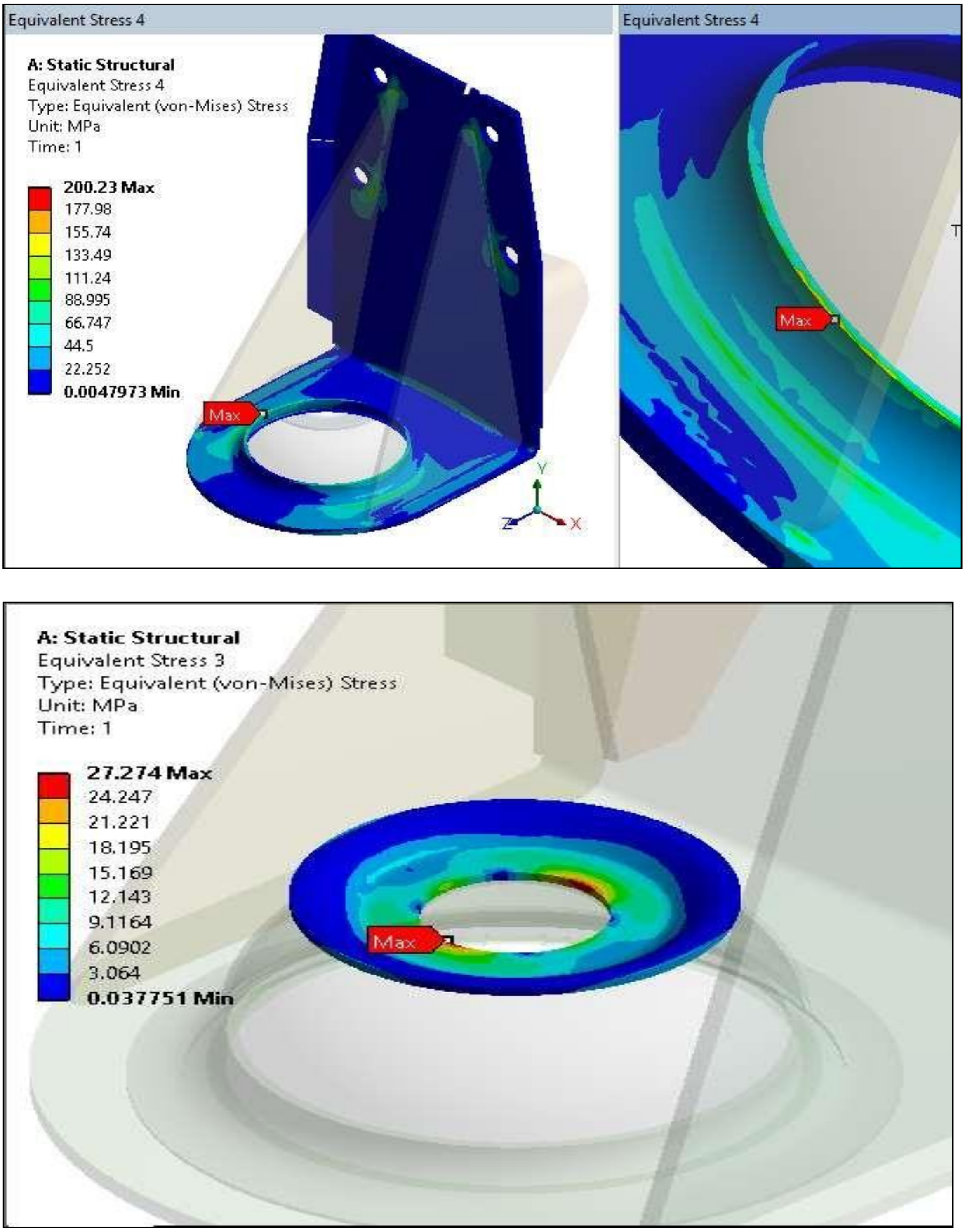

Fig. 3: Equivalent Stress on Dish

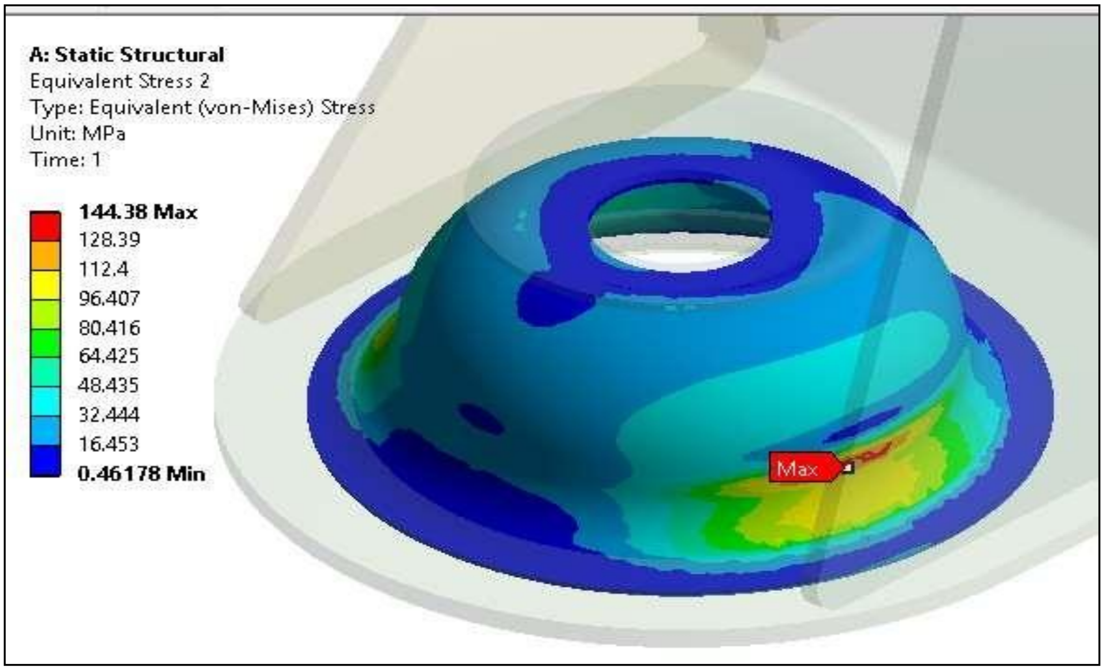

Fig. 4: Equivalent Stress on Bell shape

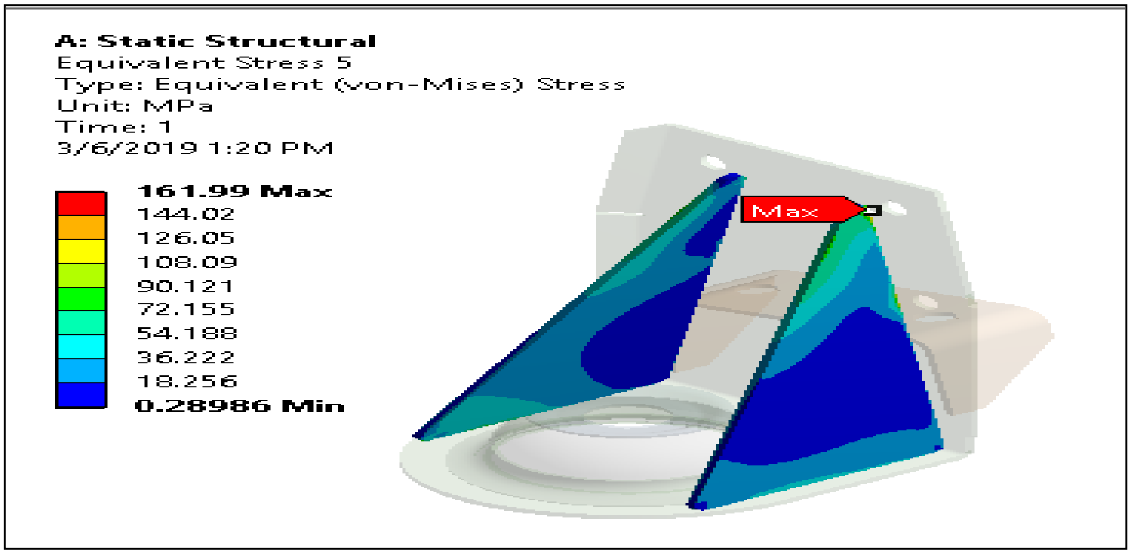

Fig. 5: Equivalent Stress on Triangular plate

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V. CONCLUSION

According to the results of this investigation, the stress in the initial iteration was 200.23 MPa, and the deformation was 0.3422mm.The observed stress and deformation for the first iteration are 329.84 MPa for the first iteration and 234.17 MPa for the second iteration, respectively.Additionally, during the actual testing, 245.12 MPa of stress and 0.34 mm of deformation were seen.The values fall within the respective compliance ranges of 4.46 % and 8.05%.When the C channel was eliminated from Iteration 1, we mass reduced by 11.5%, and when we used Parametric Analysis to Iteration 2, we mass reduced by up to 3.5%.
The cabin mounting bracket saves a total of 0.4304kg in bulk.

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