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"DESIGN & SIMULATION ON COMPRESSOR MOUNTING BRACKET IN AUTOMOBILES BY USING ANSYS SOFTWARE"

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ABSTRACT

As we know competitive pressure among the manufacturing organization are increasing day by day that is why the factors which attract mostly customers are comfort & cost. While designing the vehicle structure it is very tough job to obtain the higher stiffness and strength and also minimize the weight of the component. Compressor mounting bracket is the bracket used to mount the air conditioner compressor in the car. Mounting bracket goes under certain problems like design space issue, material used , weight of the bracket affecting the performance etc. This work is consists of Finite Element Analysis (FEA) of steel bracket & a bracket made of material i.e. steel. The CAE tools used for this work are Solidwork for modeling & ANSYS 19.2 for FE Analysis. The FE analysis of bracket is performed for the deflection, stresses and weight optimization . In ANSYS, the general process of FEA is divided into three main phases i.e., preprocessor, solution, and postprocessor. This model Of bracket of materialize (steel) is also prepared and analyzed by FEA which is then compare with the previous bracket with optimized bracket. The use of topology optimization technique then finds out weight reduction. At the same time when comparing steel exiting and new bracket , there is a material saving of 58.6 % by weight. Computer Aided FEA has become an important technology with benefits such as reduced weight, lower costs, reduced stresses and a shortened design cycle.

Key Words: *FEA, ANSYS, Solidwork, Topology Optimization, CAE, Steel.*

I. INTRODUCTION

In an automobile industry while designing the components, the most critical aspect considered is the compactness and the weight of the component. The mounting brackets are meant for supporting the structural component and electronic components such as batteries, seats, cabin, chassis, rear body and also it should support the external load such as passenger's weight. In the initial stage the bracket is designed according to the specifications of the mountings without considering any other factors. A The compressor is connected to the engine body. If the stiffness of the mounting bracket is not appropriate, it can create vibration and noise. Due to these factors, it is necessary that compressor mounting brackets have enough stiffness and strength. To verify bracket properties early in the design stage, the strength analysis needs to be performed. It measures the magnitude of load from the mass of the compressor, including safety and applies this load to the compressor mounting bracket. The stress analysis is performed with these boundary conditions and the analyst verifies the results. Parameters like cost of the vehicle and fuel efficiency are mostly influenced by the weight of the vehicle in automotive industries. As per the safety standards, it is very important to design light weight components.

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1. Motor Mounting Bracket of Car

Motor mounting section of the vehicle is the section used to mount the motor from the rear. It is made of steel. The enormous substance of the section is associated with the motor while the little finish of the section is associated with the vehicle structure for taking burden and vibrations. Because of less vibration rate and thumping pace of the motor its functional life is more. In any case, assuming the motor is old or there are a few different issues related with the vehicle structure, then there are enormous possibilities of disappointment of the motor mounting section**.**

Break in the section is the fundamental disappointment because of high burdens created in the section.

Fig.1: Engine mounting bracket of a car

2. Aero plane engine's continental engine mounting Bracket

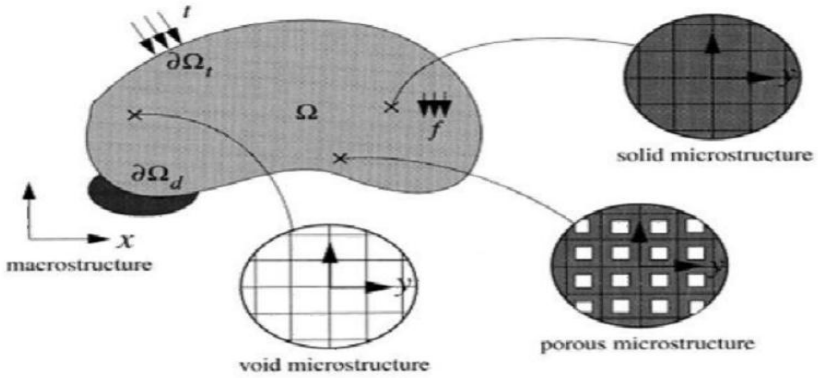

Fig .2: Aero plane engine's continental

A mounting section is utilized as a base part having a level upper surface and a stretched shoulder broadening up from the base surface. The mounting section comprises of section part having an upper surface adjusted to help a part and a level lower section surface. The base is associated with the plane design and the other part associated with the motor which takes the majority of the heap. It is comprised of aluminum projecting.

3. AC blower mounting section

The blower assumes a vital part in the car cooling framework. The unequal powers delivered from the motor and blower causes the design vibrations. The blower is upheld by the motor mounting to lessen the vibratory powers is called blower mounting section.

1.2 Topology Optimization

At the plan stage the idea of the geography advancement is vital. It is normal propensity to configuration, contingent upon the fashioner's involvement with the beginning phase of item improvement. Dependable and agreeable outcomes with the checked primary model is acquired by geography improvement. Geography improvement is a strategy which disperses the thickness of an at first homogenous volume to accomplish a specific goal work while noticing the characterized imperatives. The super goal work is limiting volume and the removal goes about as a requirement and with assembling imperative like projecting of the section. At first we need to gather the data in regards to various burdens following up on the section. The base section comes about because of testing and limited component examination (FEA) perspective for assessing last improved plan. A primary area comprises of numerous rectangular puncture materials in the underlying enhancement geography and these microstructures inside plan space material are recreated to amplify primary firmness.

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II. MODELING

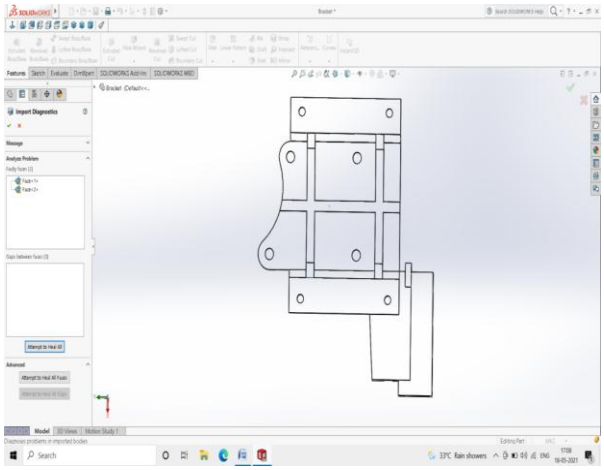

Fig.2.1 Exiting Bracket 3D wire frame layout on solidwork

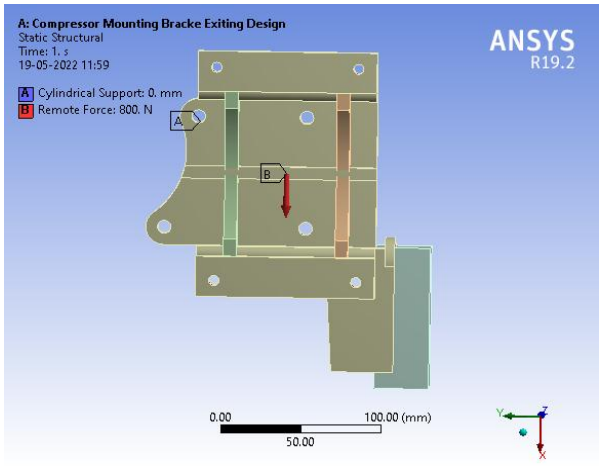

Fig. 2.2 Bracket cylindrical support and force applied

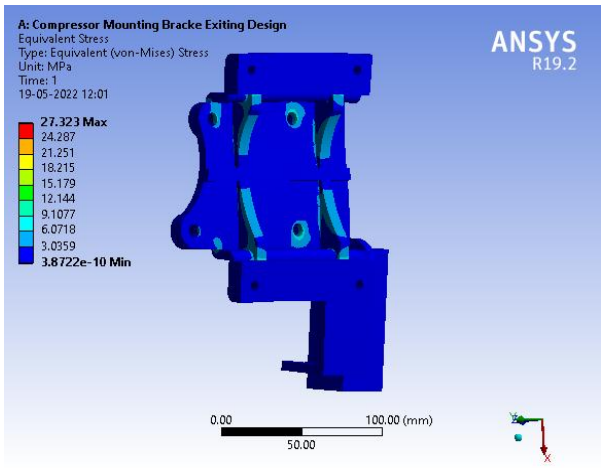

Fig. 2.3 Exiting bracket stress concentration results

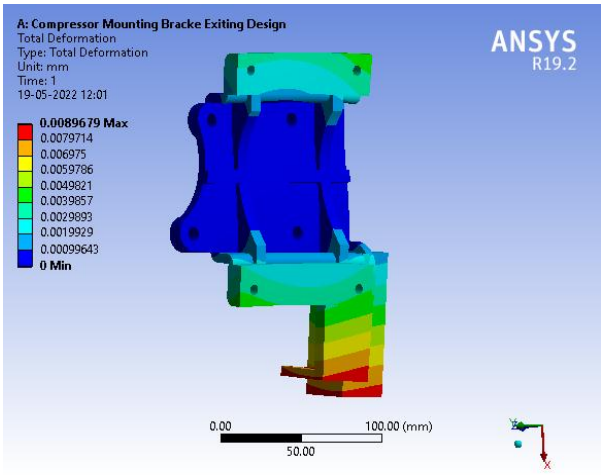

Fig. 2.4 Exiting bracket deformation results

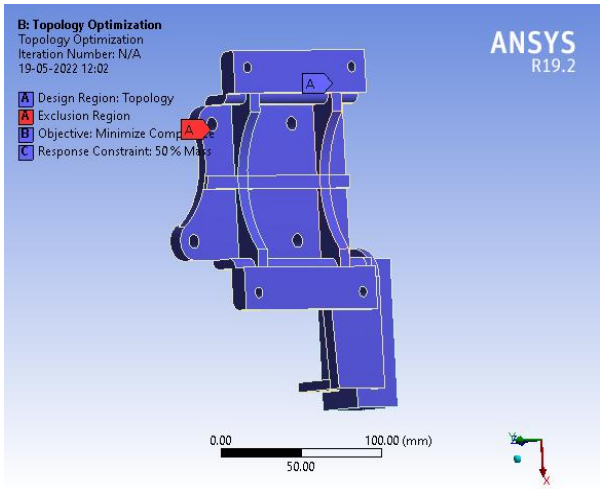

Fig. 2.5 Exiting bracket import to Topology otimization

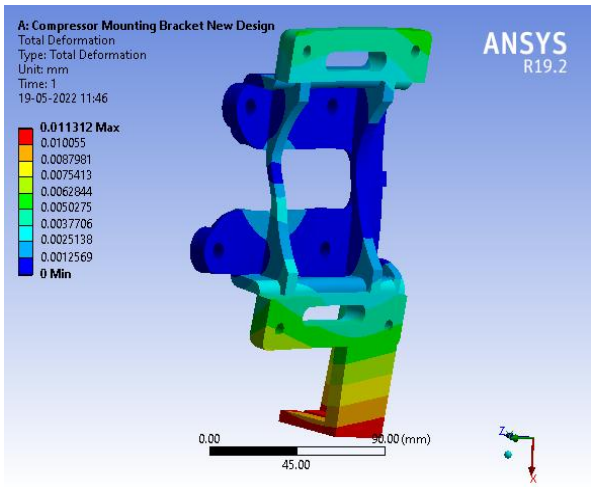

Fig. 2.6 Modify bracket stress concentration results

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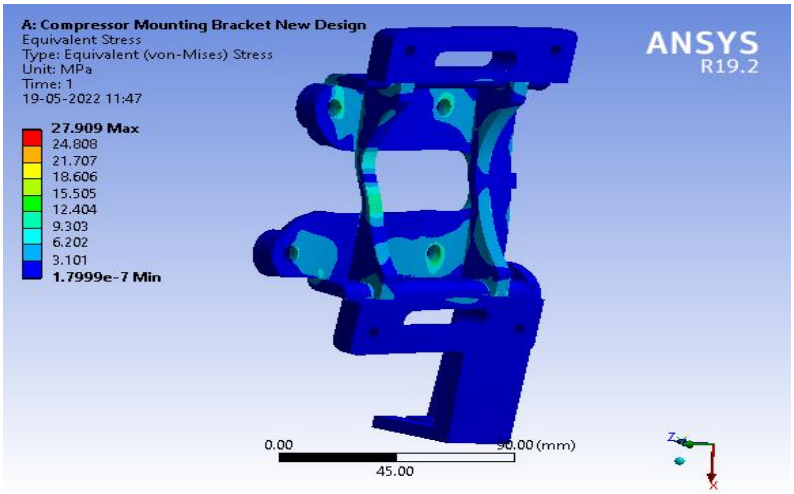

Fig.2.7 Modify bracket deformation results

III. RESULTS

Table 3.1 overall results

Compressor mounting Bracket Exiting Design	Stresses (Mpa)	Compressor mounting Bracket New Design	Stresses (Mpa)
	27.3		27.9
Compressor mounting Bracket Exiting Design deformation	Deformation (mm)	Compressor mounting Bracket New Design	Deformation (mm)
	0.0089		0.011
Bracket weight report for Exiting model	Weight (Kg)	Bracket weight report for new model	Weight (Kg)
	2.55		1.49

IV. EXPLANATION

From work done in the plan, FEA and testing sections of the undertaking it tends to be presumed that best reasonable steel for the assembling of the blower support section with least material cost is steel for which weight of the section configuration is 4.5 kg. Here leaving section and new section results has taken after completed reenactment so here distortion results figure out which is under considerable reach extremely less scope of disfigurement find out when applied 4.5 kg load on motor mounting brackets on the two cases. Here leaving section and new section results has taken after completed reenactment so here weight results figure out which is extremely less of weight when utilized changed brakect contrasted with leaving section. So here recommended altered section for future plan.

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