LEAF SPRING ANALYSIS AND OPTIMIZING USING ALUMINUM AND E GLASS PROXY WITH BORON CARBIDE

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ABSTRACT

For the suspension of wheeled vehicles leaf springs are mainly. Leaf springs looks as large plates which are joined to the casing of the trailer that stands above and down the trailer pivot. There are other type of leaf springs which are mono or one leaf springs they basically contain only one plate. These are normally thick in the center and tighten out at the end, and they don't regularly offer a lot of solidarity and suspension for towed vehicles. Drivers hoping to tow heavier loads commonly use multi leaf springs, which comprise of a few leaf springs of differing length stacked on head of one another. Professional/Engineer programming is utilized for displaying and ANSYS is utilized for investigation.

1. INTRODUCTION

Semi-elliptic leaf springs are generally utilized for suspension in light and substantial business vehicles. For vehicles likewise, these are generally utilized in back suspension

The car suspension is mounted on the axles, not immediate however some type of springs. This is done to disconnect the vehicle body from the street stuns, which might be as ricochet, pitch, roll or influence

Un-sprung weight is the heaviness of vehicle parts between the suspension and afterward street surface. This incorporates back hub gathering, directing knuckle, and front hub in the event of back drive unbending suspension, wheels, tires and brakes

Springs are put between the street haggles body. At the point when the wheel goes over a knock out and about, it rises and redirects the spring, there by putting away vitality there in

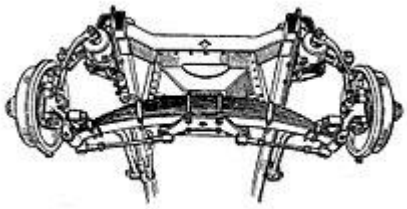
For the sake of suspension most of the time semi elliptic type of leaf springs are used for heavy vehicles.

For vehicles additionally there are generally utilized for back suspension. For most of the heavy vehicles leaf springs are main springs used for suspension purpose.

At first called an overlaid or carriage spring, and once in a while implied as a semi-roundabout

spring or truck spring, it is maybe the most prepared sort of springing, returning to past times.

1.1 Leaf Spring Suspension



Leaf springs front self-governing suspension

Figure 1: Leaf springs

2. LITERATURE REVIEW

There were an assortment of leaf springs, normally utilizing "curved". "Curved" or "full circular" leaf springs alluded to two roundabout bends connected at their tips. This was joined to the edge at the top focus of the upper curve, the base community was joined to the "live" suspension segments, for example, a strong front hub. Extra suspension parts, for example, following arms, would generally be required for this plan, however not for "semi-curved" leaf springs as utilized in the Hotchkiss drive. That utilized the lower bend, thus its name

Today leaf springs are as yet utilized in substantial business vehicles, for example, vans and trucks, SUVs, and railroad carriages. For hefty vehicles, they have the upside of spreading the heap all the more generally over the vehicle's body, though curl springs move it to a solitary point.

Dissimilar to loop springs, leaf springs likewise find the back pivot, disposing of the requirement for following arms and a Panhard bar, in this manner sparing expense and weight in a straightforward live hub back suspension.

A more current execution is the illustrative leaf spring. This plan is described by less leaves whose thickness fluctuates from focus to closes following an allegorical bend. In this plan, between leaf grinding is undesirable, and accordingly there is just contact between the springs at the closures and at the middle where the hub is associated. Spacers forestall contact at different focuses. Beside a weight sparing, the fundamental preferred position of allegorical springs is their more prominent adaptability, which converts into vehicle ride quality that moves toward that of curl springs. There is a compromise as decreased burden conveying capacity, in any case. The quality of allegorical springs is better riding solace and not as "solid" as ordinary "multi-leaf springs". It is generally utilized on transports for better solace.

3. PROBLEM DEFINITION

Present utilized material for leaf spring is steel, whose thickness is all the more accordingly expanding the general load of the leaf spring. In this postulation, composite materials Aluminum and e poxy with Boron Carbide are substituted for leaf spring. The explanation behind utilizing composites is that their densities are a lot of not as much as steel.

MATERIALS – MILD STEEL, and Aluminum, Epoxy Reinforced with Carbide.

4. ANALYSIS OF LEAF SPRING

4.1 MILD STEEL STRUCTURAL ANALYSIS

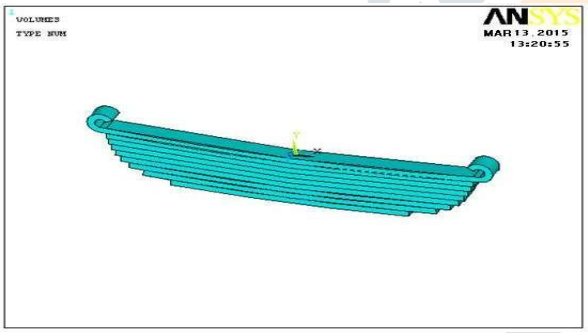
Model Imported - Element

Type: Solid20 node 95

Material Properties: Youngs Modulus (EX) : 205000N/mm2

Poissons Ratio (PRXY) : 0.29

Density : 0.000007850 kg/mm3

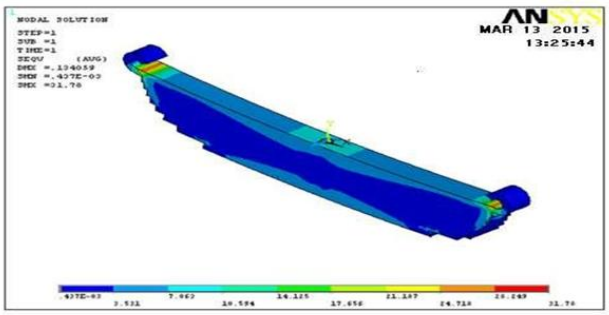


Loads

Pressure –2.408580 N/mm

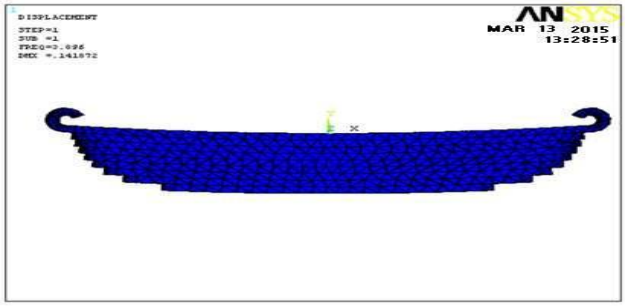
Solution

Solution –Solve –Current LS –ok

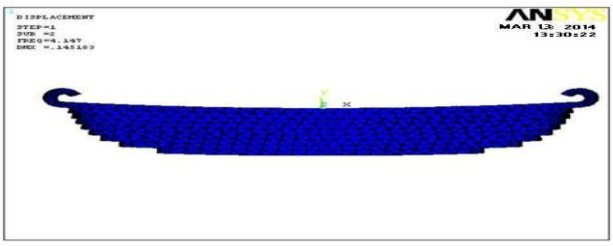


4.2 MODAL ANALYSIS

Mode 1



Mode 2



4.3 E GLASS EPOXY STRUCTURAL ANALYSIS

E GLASS EPOXY STRUCTURAL ANALYSIS

Element Type: Solid20 node 95

***Material Properties*: Youngs Modulus (EX)**

Poissons Ratio (PRXY) : 0.2

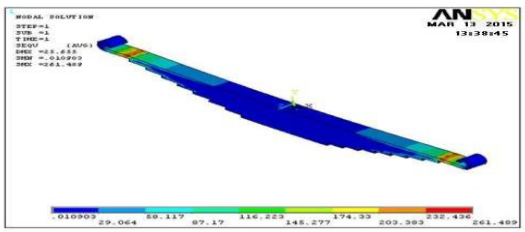
Density : 0.0000019 kg/mm3

Loads

Pressure –2.408580 N/mm2

Solution

Solution –Solve –Current LS –ok



4.4 ALUMINUM REINFORCED WITH BORON CARBIDE STRUCTURAL ANALYSIS

Element Type: Solid 20 node 95

Material Properties: Youngs Modulus (EX) :20000/mm2

Poissons Ratio (PRXY) : 0.394

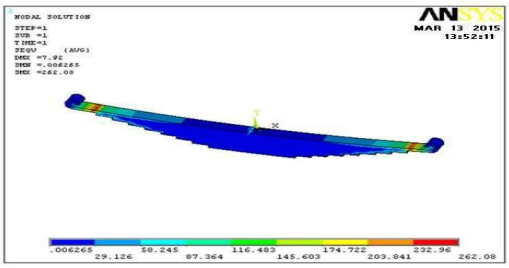
Density : 0.0000010206 kg/mm3

Loads

Pressure –2.408580 N/mm^2

Solution

Solution –Solve –Current LS –ok



Von Mises Stress

5 RESULTS AND DISCUSSION

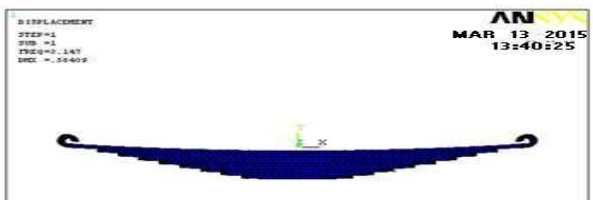
5.1 STRUCTURAL AND MODAL ANALYSIS RESULTS OF LEAF SPRING

		MILD STEEL	E GLASS	ALUMINUM REINFORCED WITH BORON CARBIDE
STRUCTURAL	DISPLACEMENT(mm)	0.134059	25.655	7.92
	STRESS (N/mm^2)	3.78	261.489	262.08
MODE 1	DEFLECTION (mm)	0.141872	0.58409	0.440237
	FREQUENCY (Hz)	3.896	3.147	4.314
MODE 2	DEFLECTION (mm)	0.145183	0.59943	0.450121
	FREQUENCY (Hz)	4.147	3.313	4.513

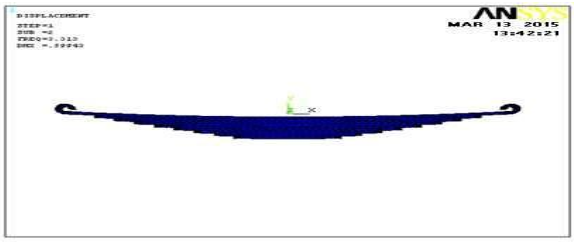
	MILD STEEL	E GLASS	ALUMINUM REINFORCED WITHBORON CARBIDE
WEIGHT (Kg)	294.5	48.454	27.5

5.2 MODAL ANALYSIS

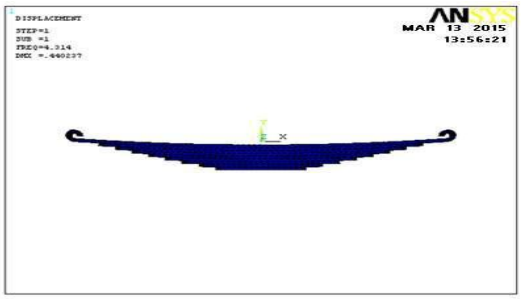
Mode 1

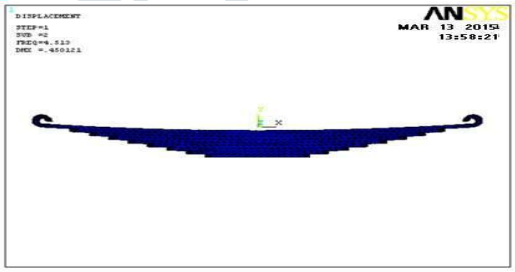


Mode 2



MODE 1





6 Conclusion

In this proposition a leaf spring is arranged and exhibited in 3D showing programming Pro/Engineer. Steel is used as material for leaf spring. In this assignment, thick than steel and have extraordinary quality The composites used are Aluminum , Glass Epoxy Reinforced with Carbide Modal examination is done to choose the frequencies. By viewing the measured assessment results, the vibrations conveyed are less for composites than delicate steel since their frequencies are less By differentiating the results for 3 materials, using Aluminum Reinforced with

Boron Carbide is better since its weight is less and besides centers around characteristics and frequencies separated are not as much as E Glass. Exhibiting is done in Pro/Engineer. By overriding. The nature of the composites is more when diverged from that of Mild Steel. Quality endorsement is done using fundamental examination in Ansys.

7 References

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