

Structural Analysis of Honeycomb Chassis in Light Commercial Vehicle

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ABSTRACT

Automotive chassis is a fundamental piece of an automobile. The skeleton fills in as body paintings for aiding the casing and unique components of the vehicle. Additionally, it should be firm adequate to oppose the sun, wind, vibration and various anxieties. Alongside power, a fundamental consideration in skeleton design is to have adequate bowing firmness for higher giving qualities. Along these lines, most strain, most symmetrical strain and diversion are import principles for the format of the skeleton. In this document works of art we done a streamlining of the vehicle case with compels of shear strain, equivalent strain and avoidance of frame. Structural structures just like the chassis may be without difficulty analysed the use of the finite detail techniques. A sensitivity evaluation is done for weight loss. We had additionally added a honey comb shape within the chassis layout for the weight loss technique. Thus right chassis version is advanced the use of popular dimensions and with an optimized concept. The chassis is modelled in SOLIDWORKS. FEA modeled chassis the use of the ANSYS workbench.

KEYWORDS

Commercial Vehicle, Driver's Cockpit, Fabric Thickness.

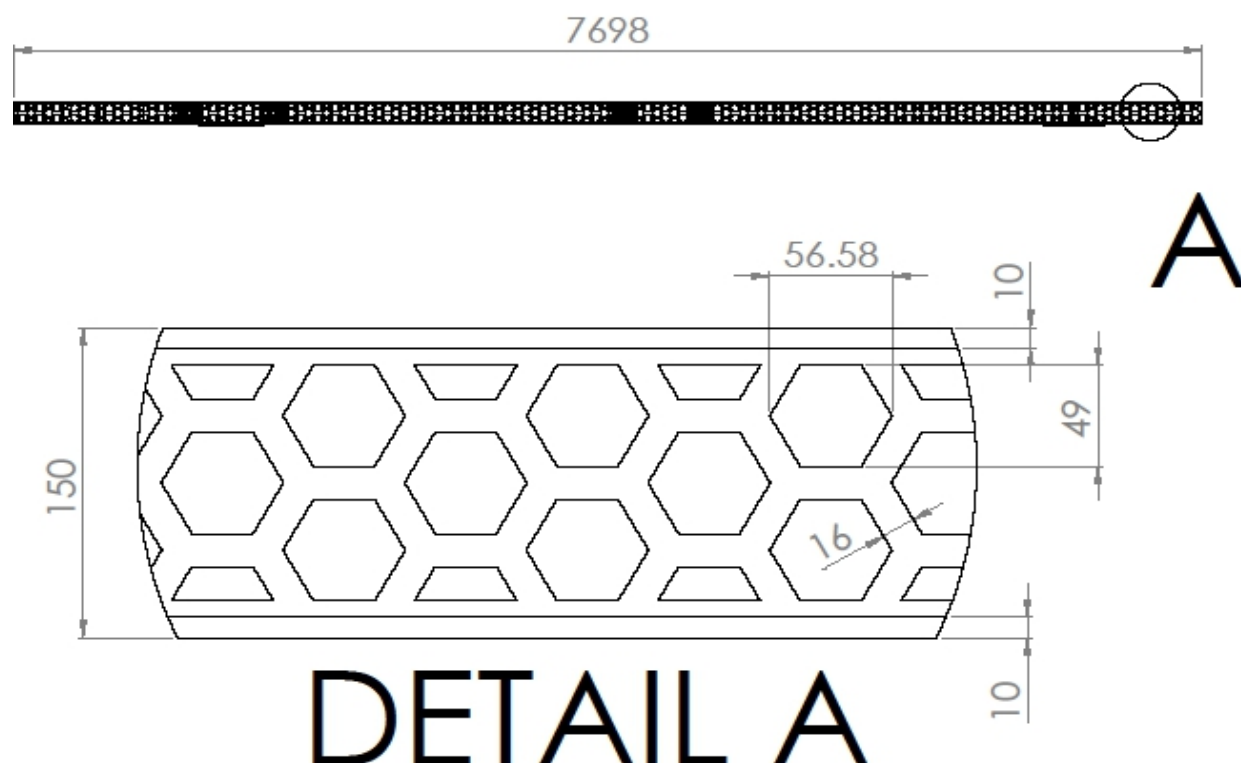
Introduction

Fundamentally chassis thought about as a structure to help the casing, motor and various components which make up the car. Body loans the whole car help and inflexibility. Undercarriage for the most part comprises two or three longitudinally expanding channels several cross over go people that converge the channels. The cross over people have a limited go stage with inside the request to allow for a longitudinally expanding carport space. The skeleton needs to include the different added substances needed for the race vehicle as well as being principally based absolutely cycle a driver's cockpit.

Solution for Problem

For fixing the trouble that's confronted via way of means of every day chassis layout, we had made an amendment in present chassis.

The chassis version of ford f a hundred and fifty vehicles was decided on and the go phase of chassis body is changed with honey comb shape dispensed on the thought region.



Honey Comp Structure

Honeycomb systems are used for layout and creation of mild weight delivery structures together with satellites, aircraft, missiles, and excessive pacetrains. Structural weight saving is the primary attention and the sandwich creation is regularly used in preference to growing fabric thickness.

This sort of creation includes skinny dealing with layers separated via way of means of a middle materia. Potential fabric for sandwich dealing with is aluminium alloy excessive tensile metallic, titanium and composites relying at the particular undertaking requirement. Several kinds of middle shapes and middle fabric had been carried out to the charter of sandwich systems. Among them, the honeycomb middle that includes very skinny foils within the form of hexagonal cells perpendicular to the facings is the maximum popular. This paper offers with the layout and structural evaluation of mild automobile chassis with honey comb sandwich creation is one of the maximum valued structural engineering improvements advanced via way of means of the composites.

Material for Analysing Chassis

Structural Steel

Structural metallic is chosen as engineering fabric especially due to their incredible corrosion resistance in lot of environments. The corrosion resistance of structural metallic is because of their excess chromium substance. To make a "underlying metallic" primary, there ought to be in any event 12 rate chromium (Cr) within the metallic. As indicated by the old style hypothesis, chromium desk work a story oxide that shields the fundamental iron-chromium combination from consuming. To create the ensuring oxide, the underlying metallic ought to be uncovered to oxidizing specialists. (William, 2006). In the format standards, 317 is better chromium, nickel and molybdenum model of 316 underlying planned for the most part for improved power and erosion opposition. Machinability for such a primary metallic is Low rates and steady feeds will diminish this present composite's inclination to artworks solidifies. Harder than 304 underlying with an extended wiry chip, the use of chip breakers is suggested. Welding strategy might be the utilization of all not unusual place combination and opposition strategies other than oxyacetylene welding have tried fruitful. Use AWS E/ER317 or 317L filler metallic for high-quality outcomes. All not unusual place warm running approaches are feasible with this combination. Warmth to 2100-2300 F (1149-1260°C).

Try not to run this texture under 1700°F (927°C). For unrivaled erosion obstruction, a post-compositions toughening is recommended and Shearing, stepping, heading and drawing might be efficiently done. To do away with inner stresses, a post-paintings annealing is suggested. Mechanical homes and traditional composition of Structural Steel is proven within the underneath table.

Kevlar

Kevlar may be a poly paraphenyleneterephthalamide (PPDT) commonly called para-aramid. The construction comprises of benzene rings obligated for high warm steadiness close by para replacements which end in high modulus and strength. The fibers for filaments are expelled through the turning of the antecedent. The expelled rodlike para-aramid structure has high anisotropic properties. The strength and solidness is higher inside the pivotal bearing and brings down inside the cross over heading. Kevlar is shaped from a buildup response of 1, 4 paraphenylenediamine and terephthalic corrosive.

The presence of amine bunches on fragrant ring prompts a rodlike design which has high glass progress temperature and low dissolvability. The chains of polymer are associated with each other by means of Hydrogen holding between neighboring polar amide bunches clarifying what Kevlar is. The fiber structure is comprising of deliberate arranged particles corresponding to at any rate each other framing glasslike structure. Because of high glass progress temperature and helpless dissolvability, these filaments are hard to measure through traditional drawing procedures henceforth softening is utilized for their manufacture.

During melt turning, the PPDT arrangement is expelled in a very spinneret and drawn through an air hole prompting the direction of the fluid glasslike areas inside the stream bearing. The polymer chains additionally adjust during a fiber hub prompting a serious level of anisotropy during this course.

S2-Glass

Old Egyptians made holders of coarse filaments drawn from heat mollified glass. The French researcher, Reaumur, considered the capability of shaping fine glass strands for woven glass articles as early on the grounds that the eighteenth century.

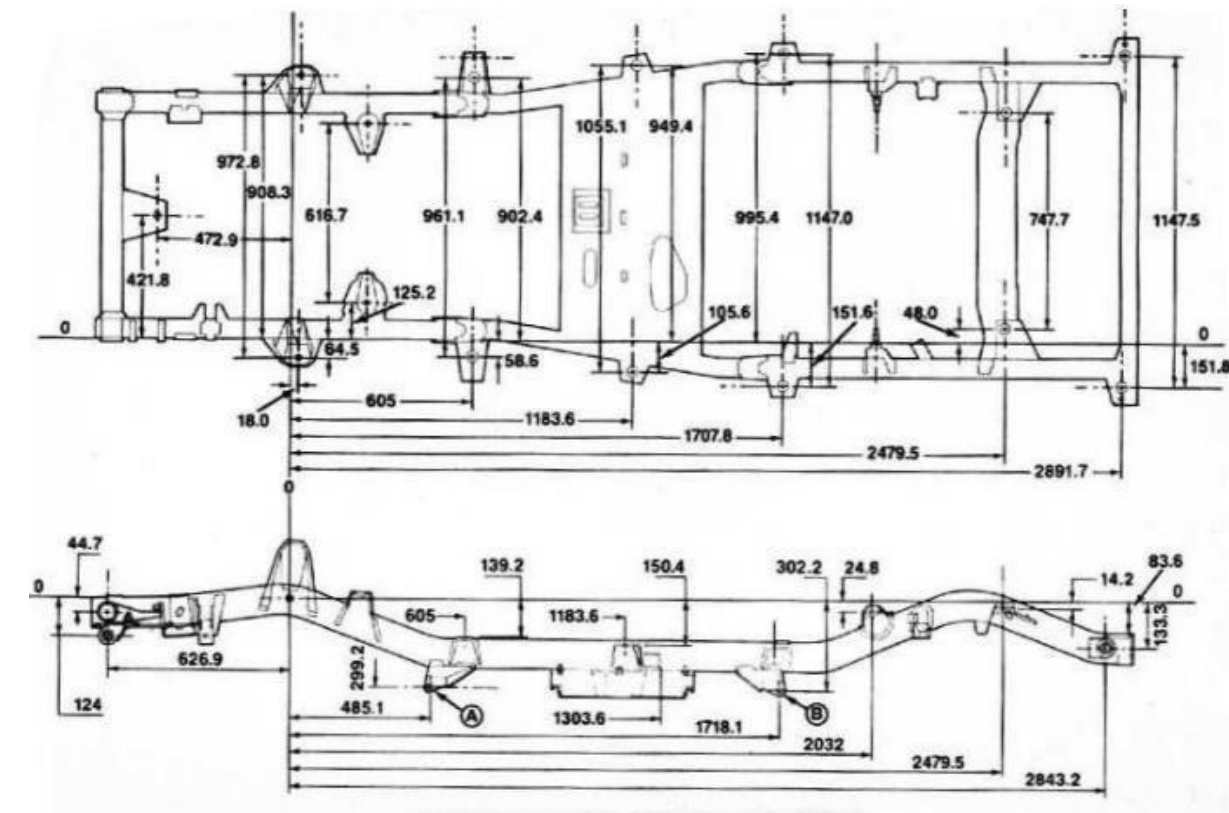
Persistent glass strands were first fabricated in quite a while by Owens Corning Textile Products inside the 1930's for top temperature electrical applications. Progressive and developmental innovation keeps on improving assembling measures for nonstop optical fiber creation. Crude materials like silicates, pop, dirt, limestone, boric corrosive, fluorspar or different metallic oxides are mixed to make a glass cluster which is softened during a heater and refined during parallel stream to the front hearth.

The liquid glass streams to platinum/rhodium combination bushings then through singular bushing tips and openings beginning from 0.76 to 2.03 mm (0.030 to 0.080 in) and is quickly extinguished and constricted in air (to forestall crystallization) into fine filaments beginning from 3 to 35 μm .

Mechanical winders pull the strands at lineal speeds up to 61 m/s over an utensil which covers the filaments with a fitting compound estimating to help further handling and execution of the top items.

High strength glass strands like S2 Glass are pieces of alumino silicates weakened at higher temperatures into fine filaments beginning from 5 to 24 μm . A few different kinds of silicate glass filaments are produced for the material and composite industry. Different glass compound structures depicted beneath from ASTM C 162 were created to supply mixes of fiber properties coordinated at explicit end use applications.

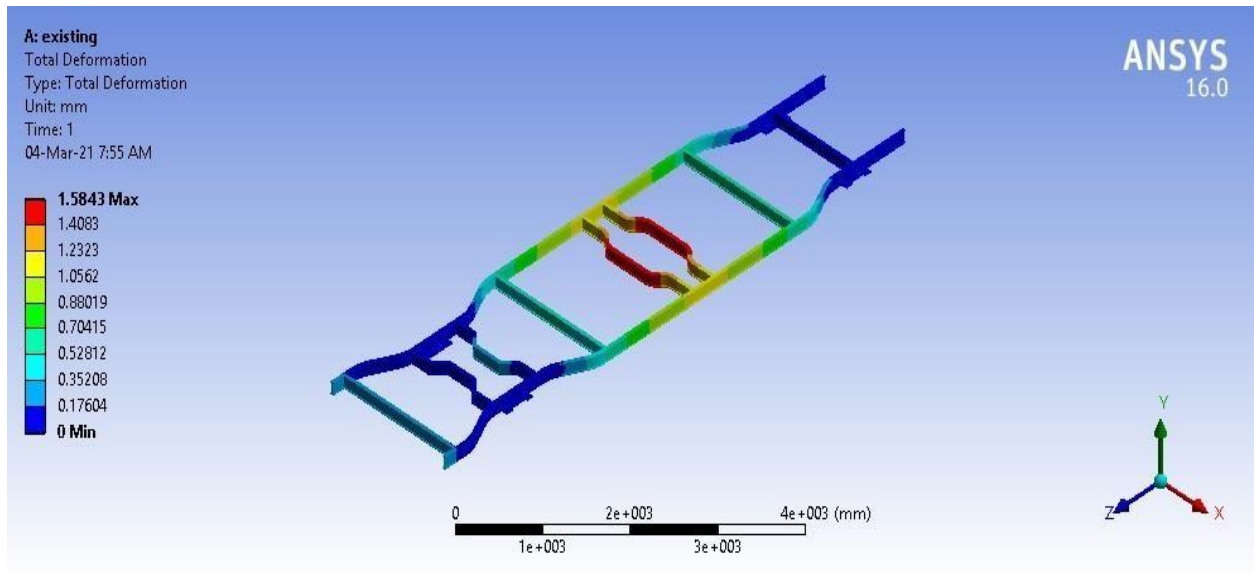
2dLayoutofforDF 150ChassiswithDimension



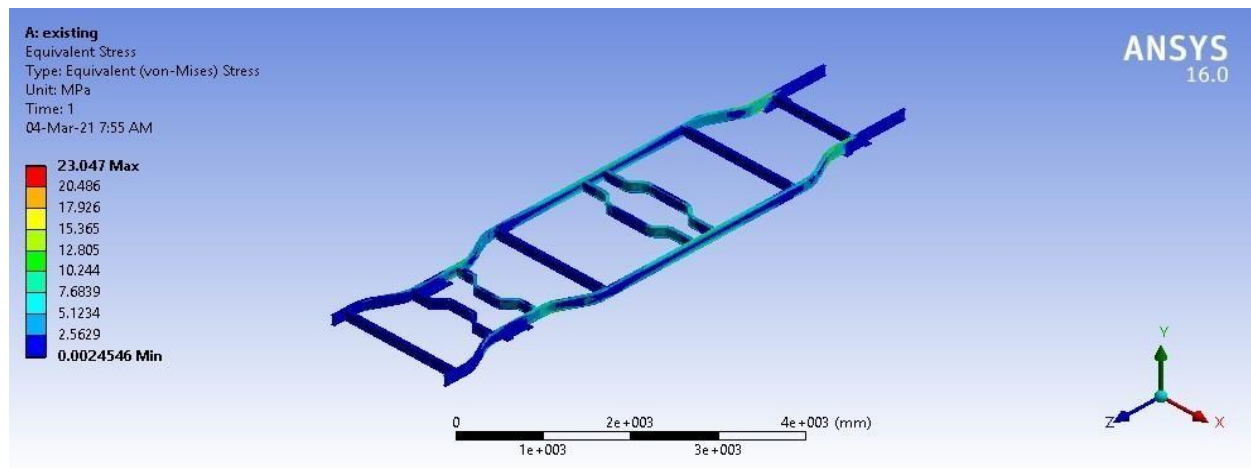
ResultsofNormal Chassis

1. StructuralSteel

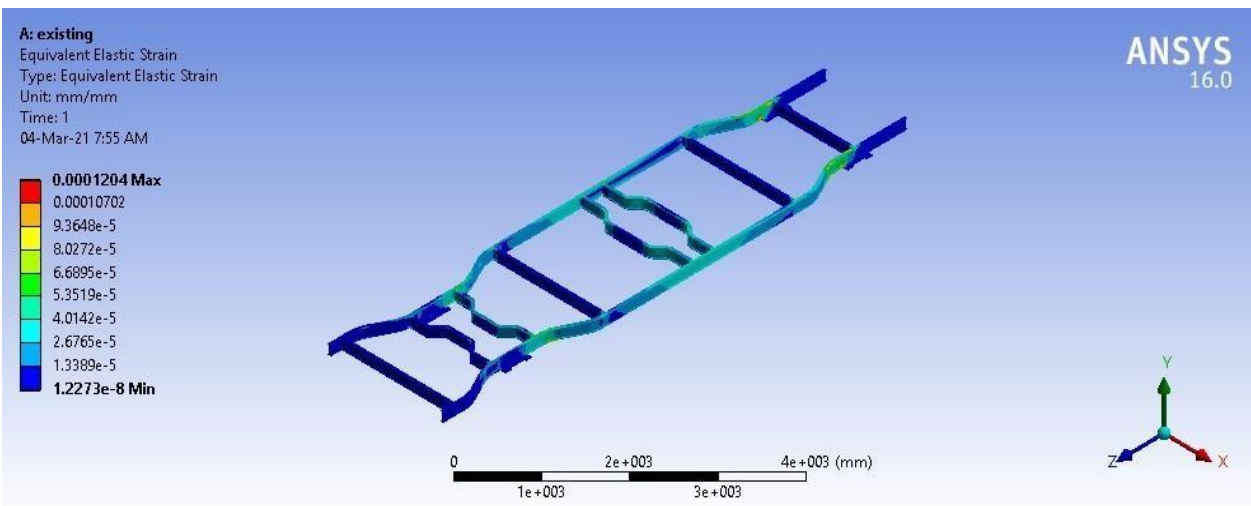
TotalDeformation



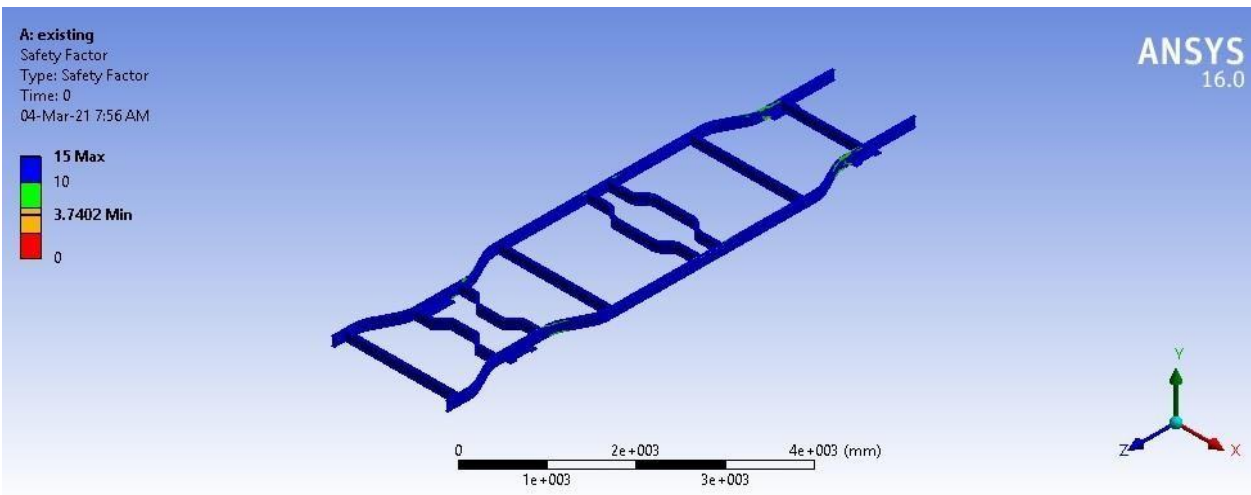
StressDistribution



StrainDistribution

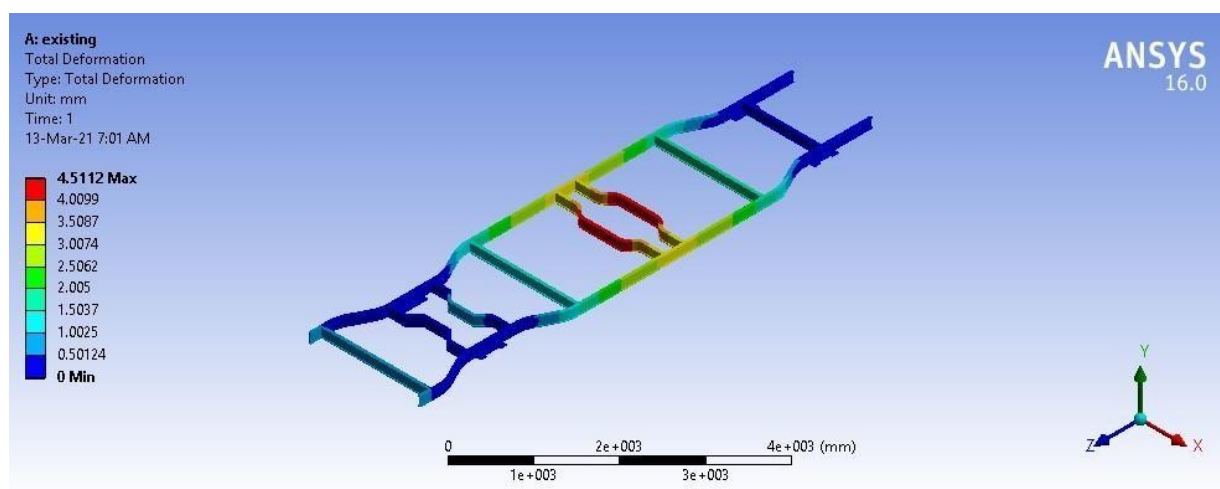


SafetyFactor

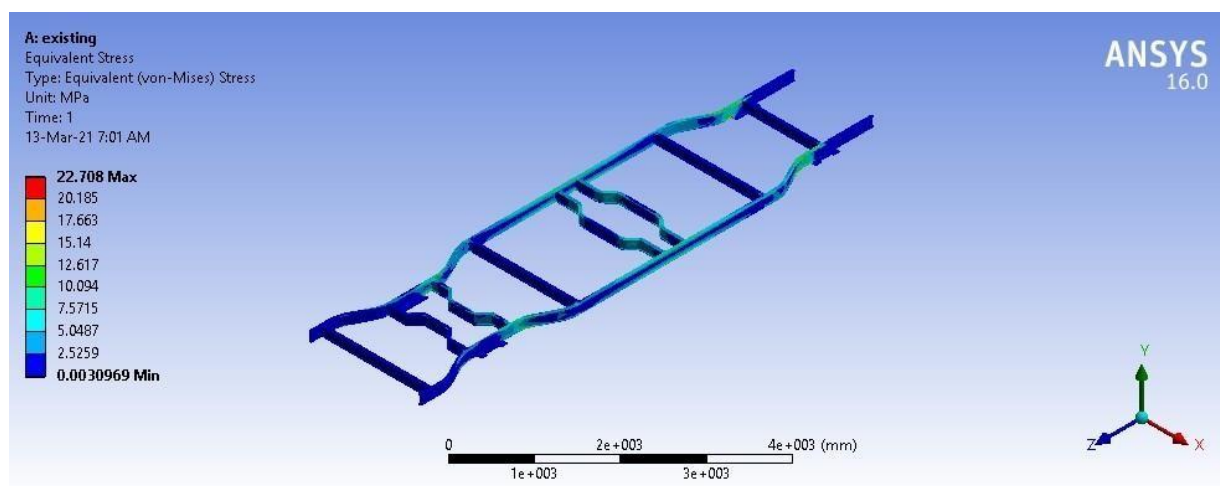


2. Kevlar

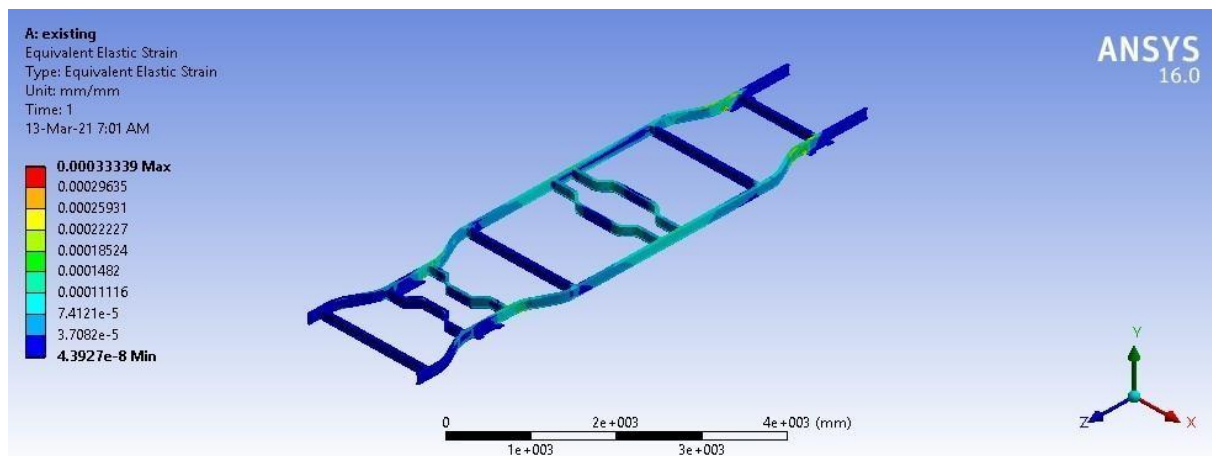
TotalDeformation



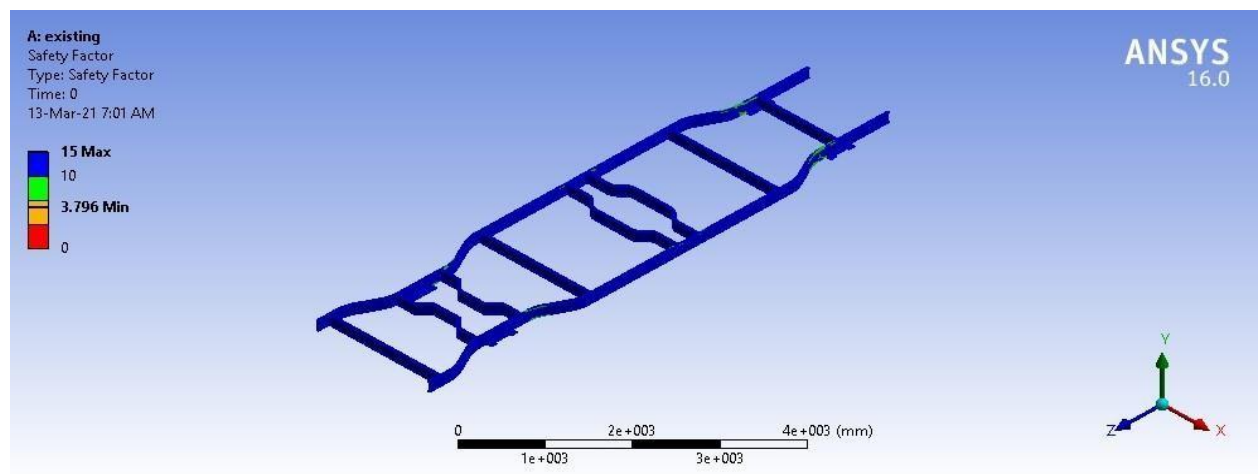
StressDistribution



StrainDistribution

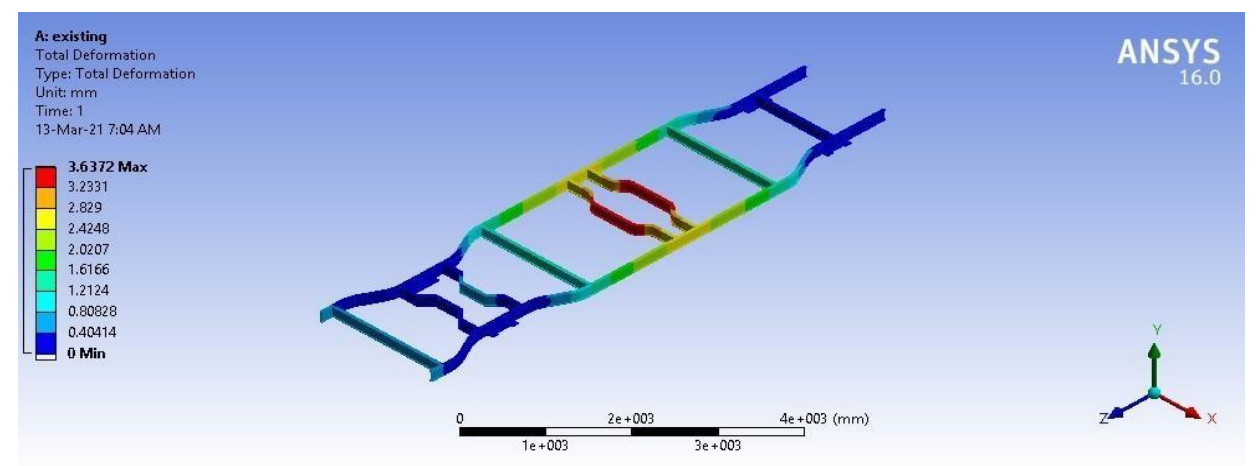


SafetyFactor

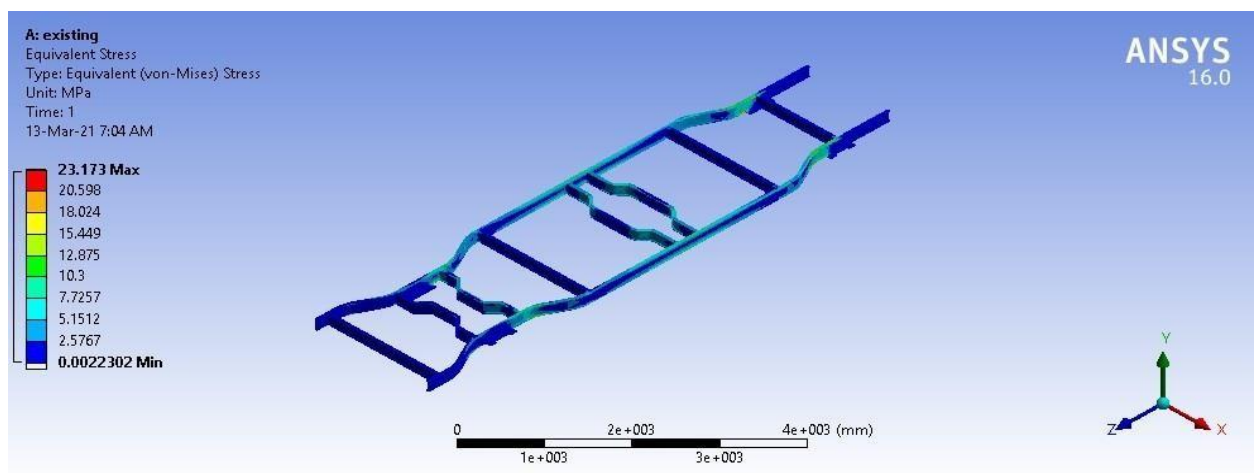


3. S2-Glass

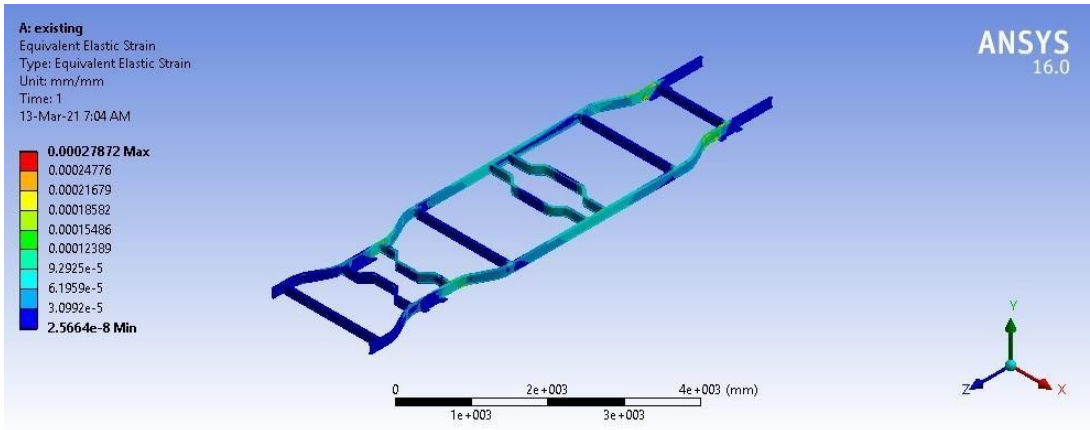
TotalDeformation



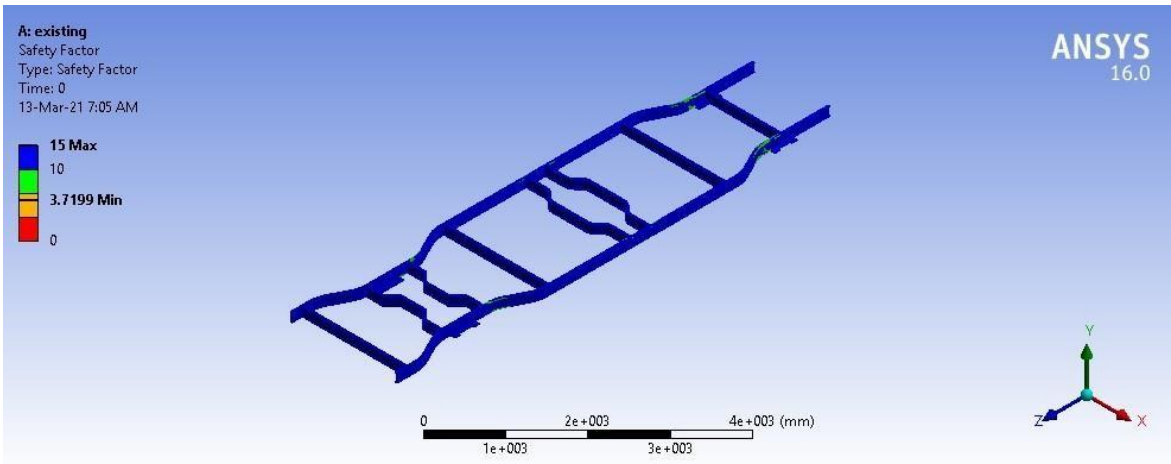
StressDistribution



StrainDistribution



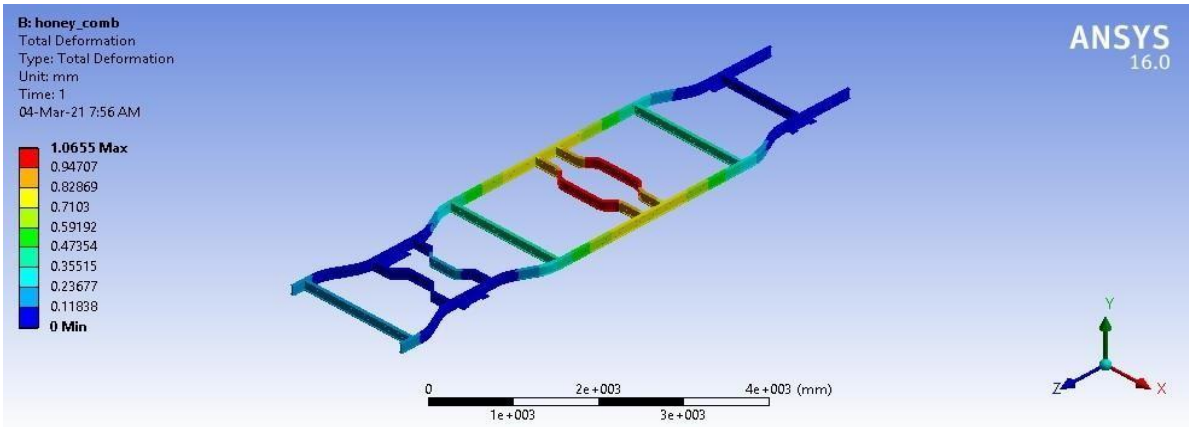
SafetyFactor



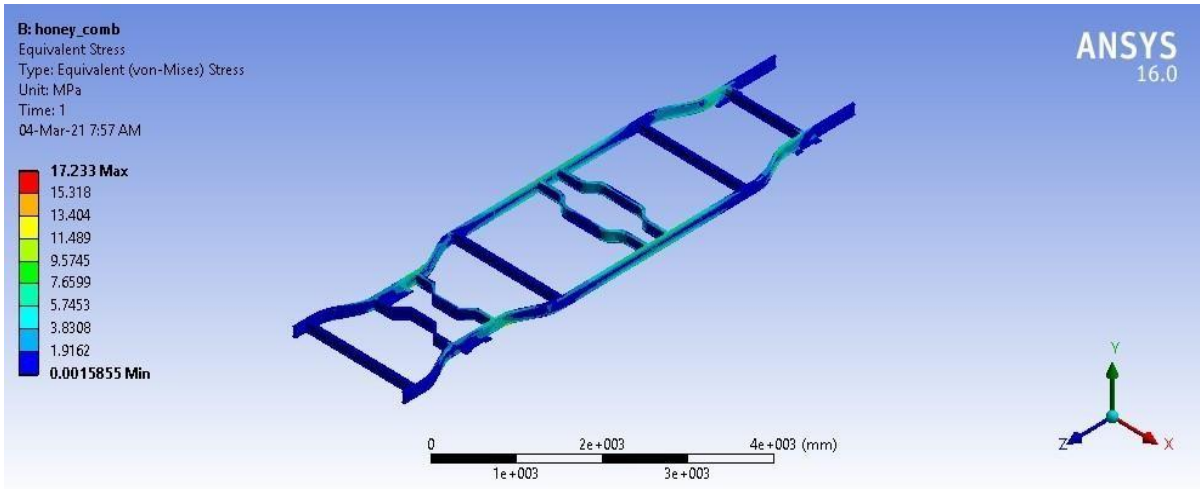
Resultsof ChassiswithHoneyCombstructure

1. StructuralSteel

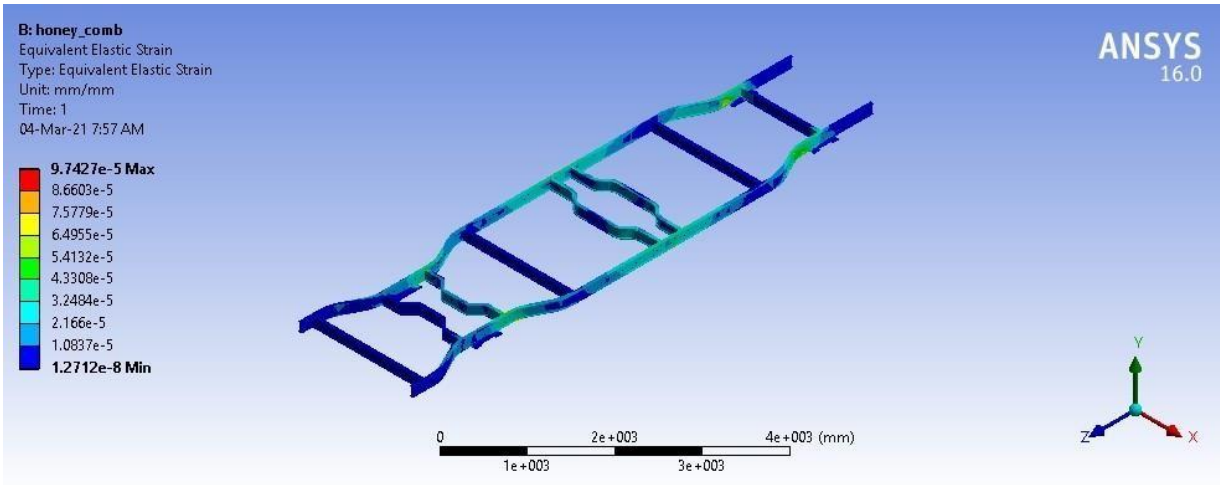
TotalDeformation



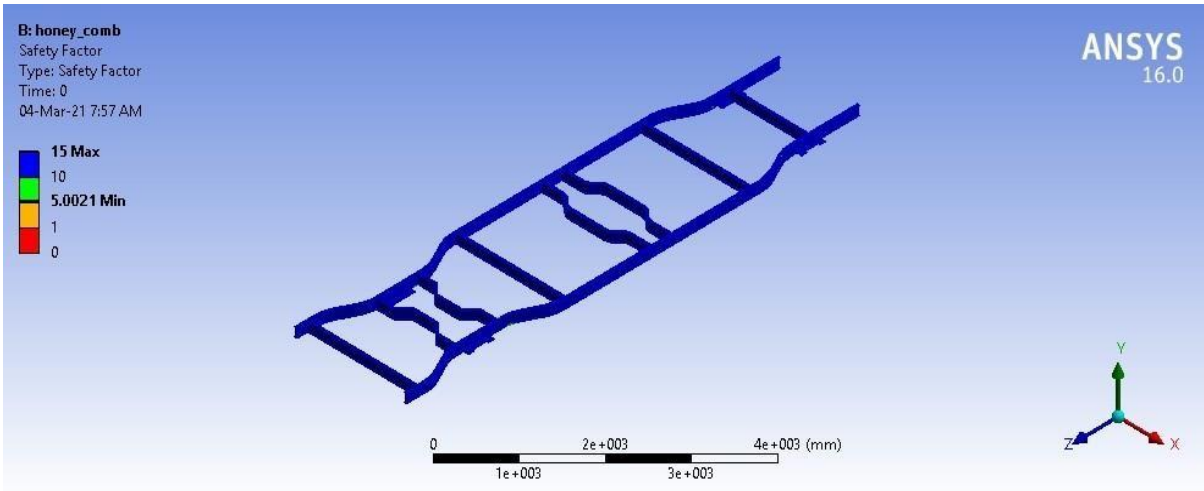
StressDistribution



StrainDistribution

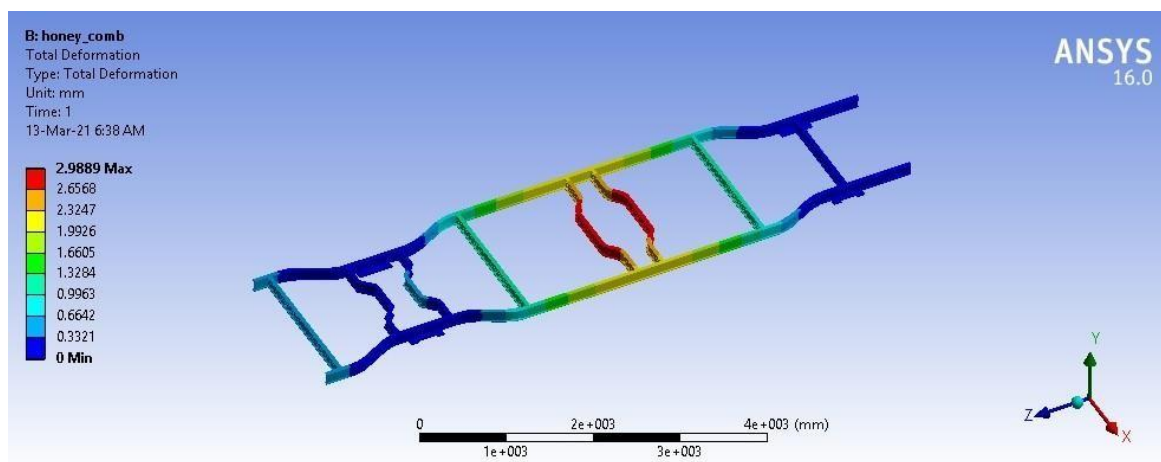


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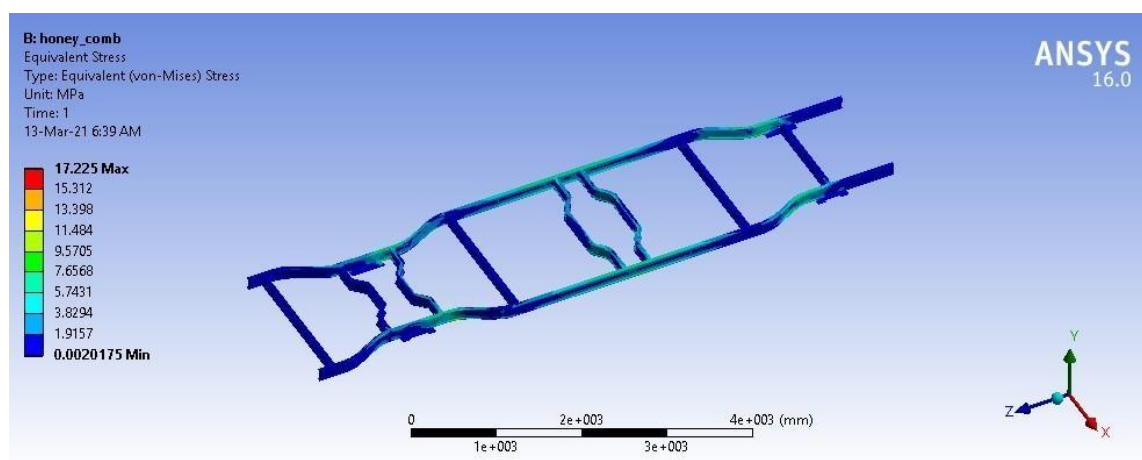


2. Kevlar

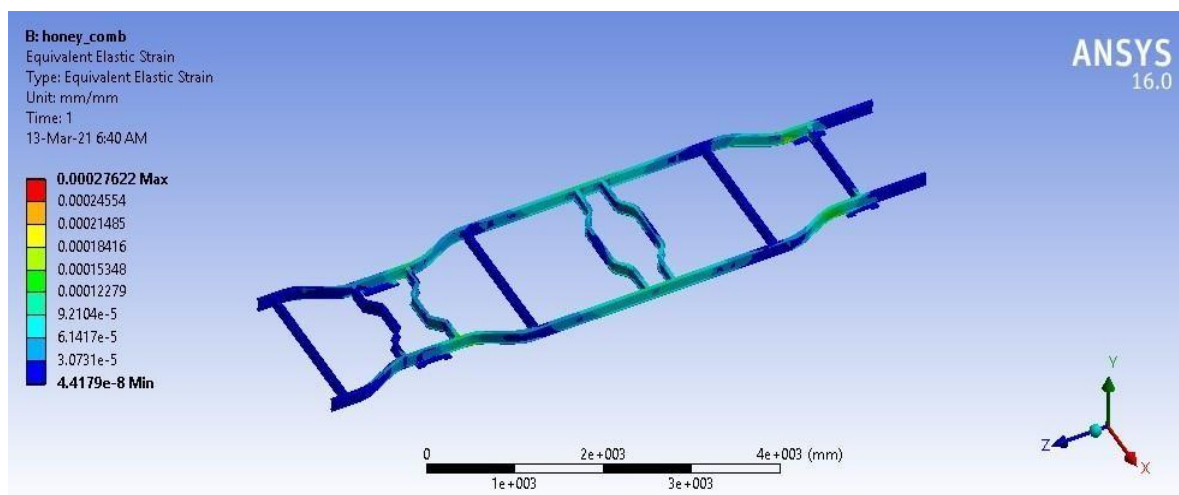
TotalDeformation



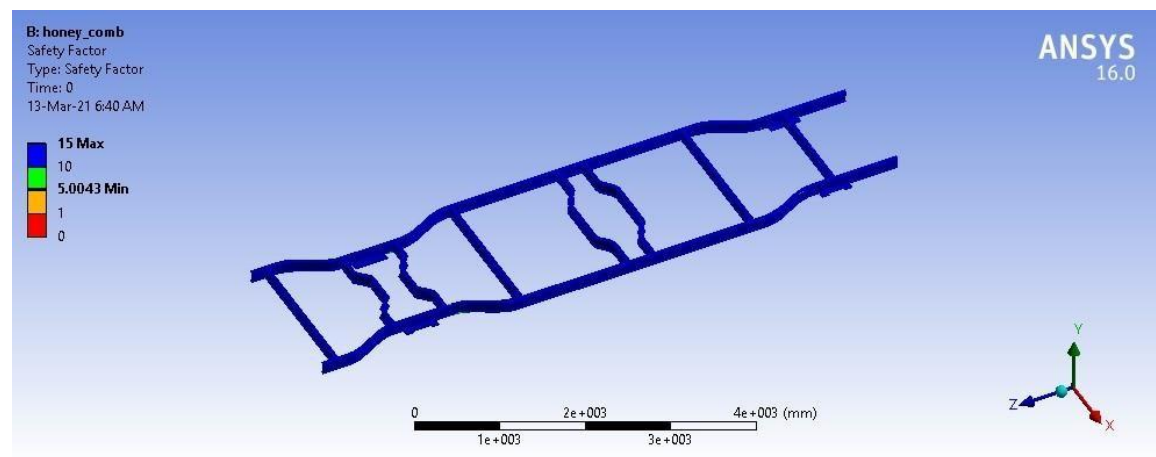
StressDistribution



StrainDistribution

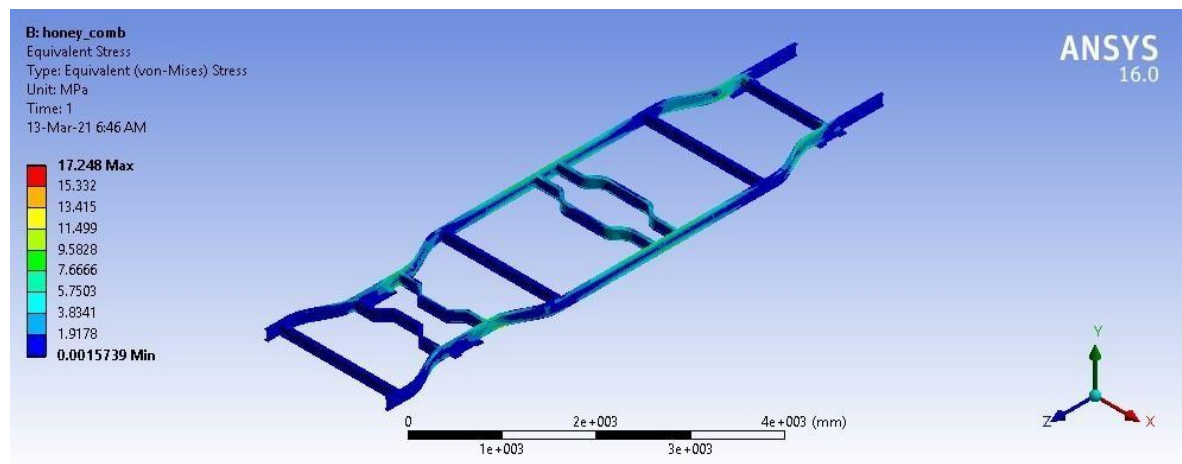


SafetyFactor

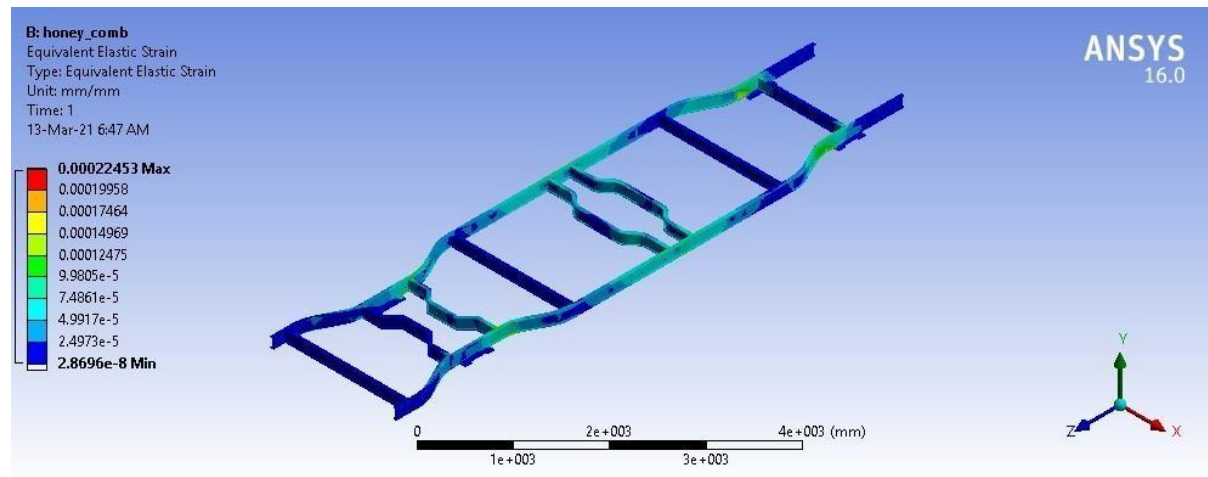


3. S2-Glass

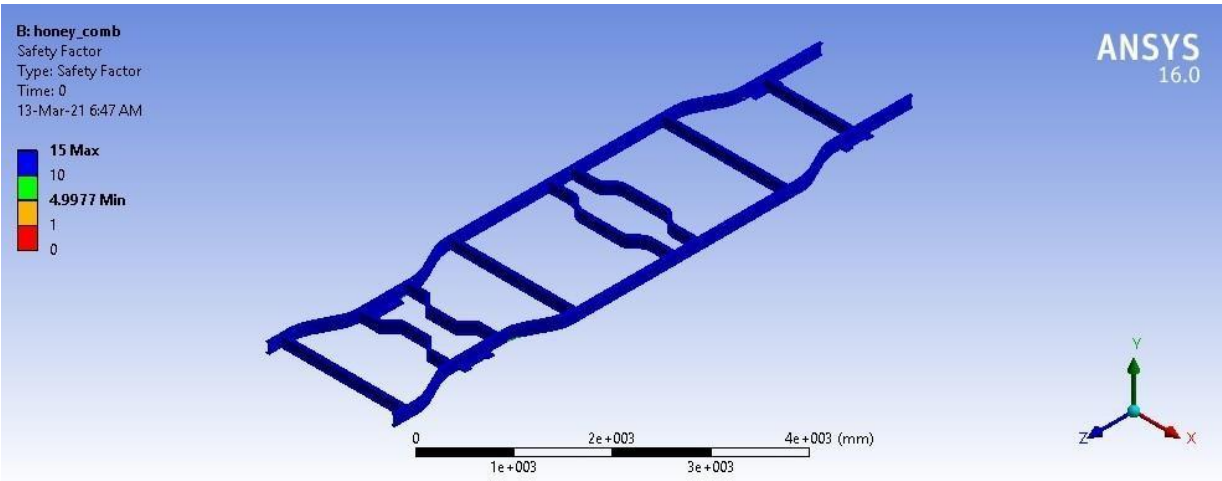
Total DeformationStressDistribution



StrainDistribution



SafetyFactor



ComparisonbetweenExistingChassiswithHoney Comb Structure

PROFILES	MATERIALS	DEFORMATION(MM)		STRESS(MPA)		STRAIN		MASS(KG)
		Max	Min	Max	Min	Max	Min	
Existingchassis	Structuralsteel	1.58	0	23.04	2.45E-3	1.2E-4	1.22E-8	552.6
	Kevlar	4.51	0	22.7	3.09E-3	3.33E-4	4.39E-8	101.37
	S2-Glass	3.63	0	23.1	2.22E-3	2.78E-4	2.56E-8	173.17
Honeycombstructure	Structuralsteel	1.06	0	17.23	1.58E-3	9.74E-5	1.27E-8	462.23
	Kevlar	2.98	0	17.22	2.01E-3	2.76E-4	4.41E-8	84.79
	S2-Glass	2.45	0	17.24	1.57E-3	2.24E-4	2.86E-8	144.85

Conclusion

Chassis may be a significant segment during a vehicle framework. For vehicles, frame comprises of a gathering of the multitude of fundamental pieces of a vehicle (without the body) to be prepared for procedure out and about. during this paper the FORD F 150 model undercarriage has been planned and upgraded to downsize the burdens and redirections. Improvement was additionally done to extend the structural stability and dealing efficiency of chassis structure. Initially the planning was through with specified dimensions of real time model. The designed models analyzed with the assistance of existing working conditions and this results are compared with the optimized result to get the higher structure. Honeycomb structure distributed throughout the whole area of chassis frame and therefore the results obtained by analyzing the structure is compared with an existing results, from the obtained results it's clear that the honey comb structured chassis gives an appropriate result in comparison with the prevailing design of chassis frame. The materials like Kevlar and s2 glass is taken into account as material for chassis and its results also are compared. Considering the deformation and stress distribution of honey comb chassis, it's found that it's more advantages in comparison with the prevailing one and while considering the mass of every structures honey comb carries less weight in comparison with existing solid frame structure. The fabric which is best suitable for real time implementation is Kevlar fiber which provides excess weight reduction and also the results lies on the considerable limit.

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