FEA ANALYSIS OF TWO WHEELER SHOCK ABSORBER SPRING

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Abstract—A helical spring may be defined as an elastic member whose primary function is to deflect or distort under the action of applied load. It recovers its original shape when load is released. They are made of wire coiled into a helical form, the load being applied along the axis of the helix. The main property of helical spring is to act in tension or in compression when the load is applied at both ends.The shock absorbers duty is to absorb or dissipate energy. One design consideration, when designing or choosing a shock absorber, is where that energy will go. This paper gives FEA analysis of shock absorber spring of Hero Splendor 110 cc. The parameters viz. directional deformation, equivalent elastic strain(von misses), equivalent stresses, total deformation obtain from ANSYS R15.0. Pro-e, Creo 3 software's are used for modeling purpose.

Keywords—Shock absorber spring, FEA,Pro-e, Creo 3.

INTRODUCTION

Suspension system play a vital role in automobile industry. Irregularities on road make a vehicle difficult in comfort for human. A better suspension paly vital role in human comfort irrespective of cost, again it may lead to accident. A conical compression spring has advantage that it generates negative solid height, constant spring rate,smooth oscillation and good physical stability, hence we can say that conical spring can operate in harsh condition compared to regular spring.

A helical spring may be defined as an elastic member whose primary function is to deflect or distort under the action of applied load. It recovers its original shape when load is released. They are made of wire coiled into a helical form, the load being applied along the axis of the helix. The main property of helical spring is to act in tension or in compression when the load is applied at both ends. Helical coils are mostly uses in springs, cables etc. These are used in brakes and clutches for applying the forces and controlling the motion of vehicles and machines. Similarly these are also useful for storing the energy in watches and toys. Most important application of helical spring is for reducing the effect of shock and vibrations in vehicles and machine foundation.The shock absorbers duty is to absorb or dissipate energy. One design consideration, when designing or choosing a shock absorber, is where that energy will go. In most dashpots, energy is converted to heat inside the viscous fluid. In hydraulic cylinders, the hydraulic fluid will heat up, while in air cylinders, the hot air is usually exhausted to the atmosphere. In other types of dashpots, such as electromagnetic ones, the dissipated energy can be stored and used later. In general terms, shock absorbers help cushion cars on uneven roads.

II.LITERATURE REVIEW

[1]**Design and Static Analysis of Shock Absorber (IJIRST-Volume 2-Issue 12-May 2016-ISSN (online): 2349-6010)-**A shock absorber or suspension system is a mechanical assembly designed to smooth out or damp shock impulse, and dissipate kinetic energy. The shock absorbers duty is to absorb or dissipate energy.In a automobile, it reduces the impact of traveling over rough surface, which leads to improvement in ride quality, and increase in comfort due to substantially decreased amplitude of disturbances.[2]**Design And Analysis Of A Shock Absorber (IJRET-ISSN: 2319-1163)-**In this project a shock absorber is designed and a 3D model is created using Pro/Engineer. The model is also changed by changing the thickness of the spring. Structural analysis and modal analysis are done on the shock absorber by varying material for spring, Spring Steel and Beryllium Copper. The analysis is done by considering loads, bike weight, single person and 2 persons. Structural analysis is done to validate the strength and modal analysis is done to determine the displacements for different frequencies for number of modes. [3]**Design and Analysis of Two Wheeler Shock Absorber Coil Spring (IJMER)-**The objective of this project is to design and analyze the performance of Shock absorber by varying the wire diameter of the coil spring.

III STRUCTURAL ANALYSIS RESULTS

The below figure shows Helical Shock Absorber Spring model. Which shows total length, coil diameter, pitch, wire diameter of helical spring. The models are prepared with the help of Pro-e &Creo 3.

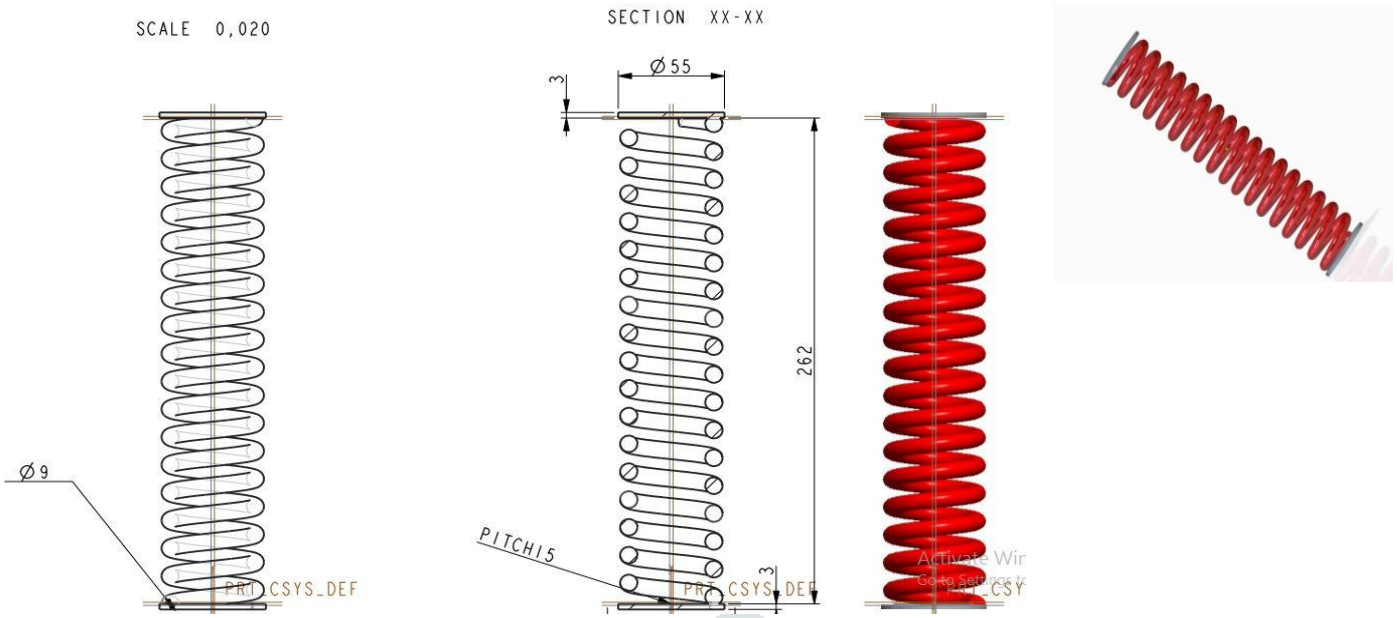


Figure 1: 2D model of Helical shock absorber spring.

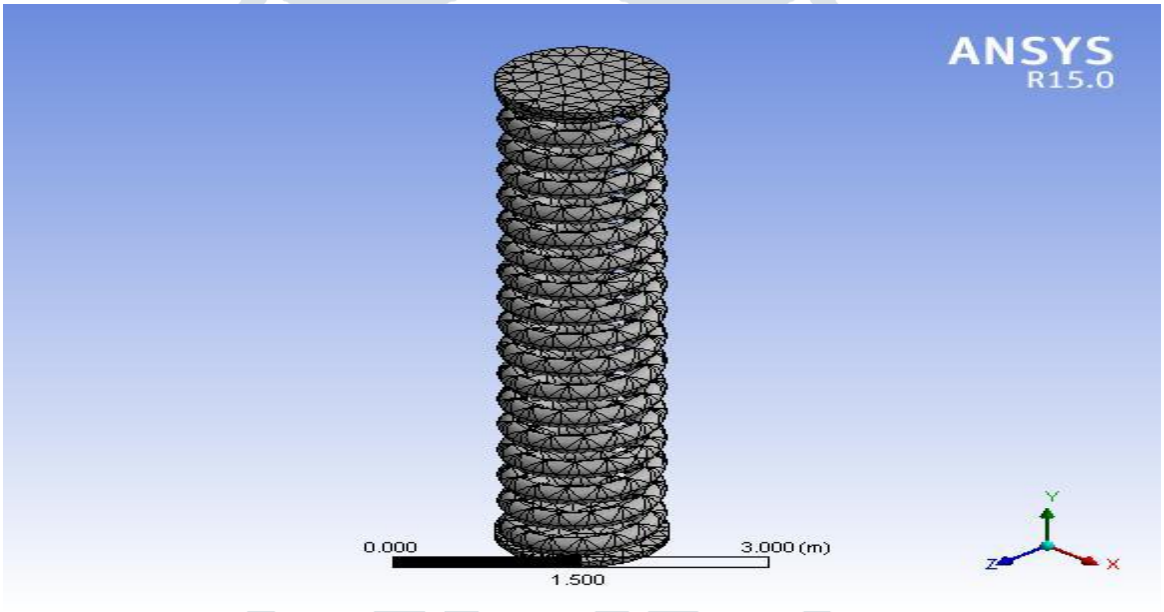


Figure 2: Meshing of Helical shock absorber spring with (NODES- 12750 / Element – 5655)

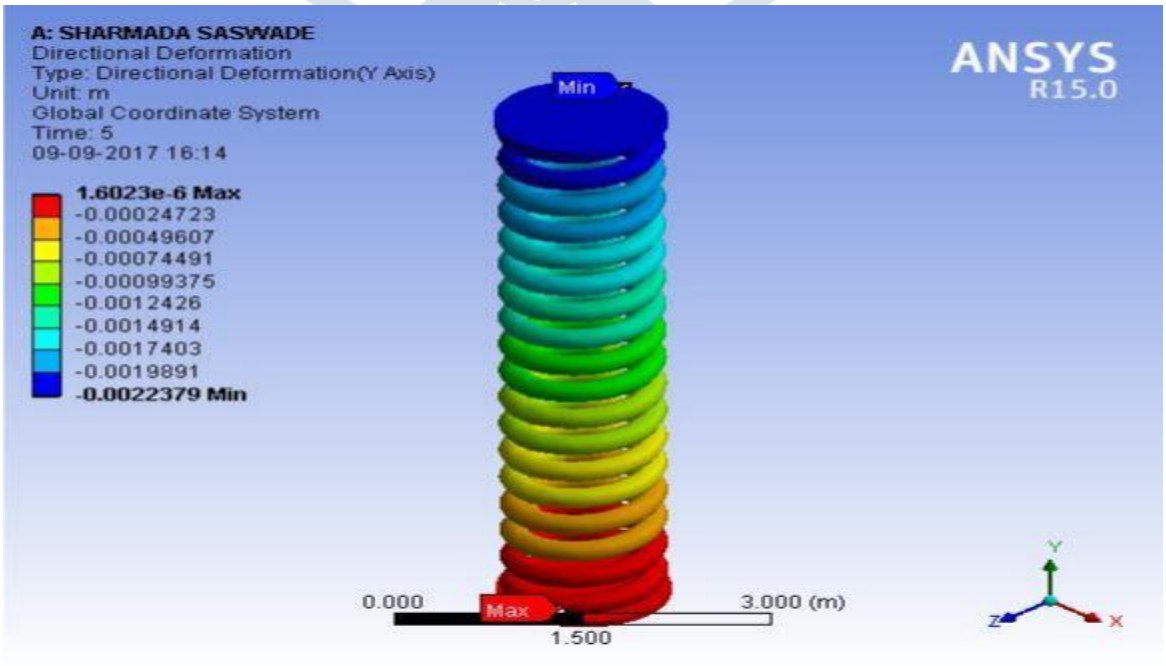


Figure 3: Directional deformation

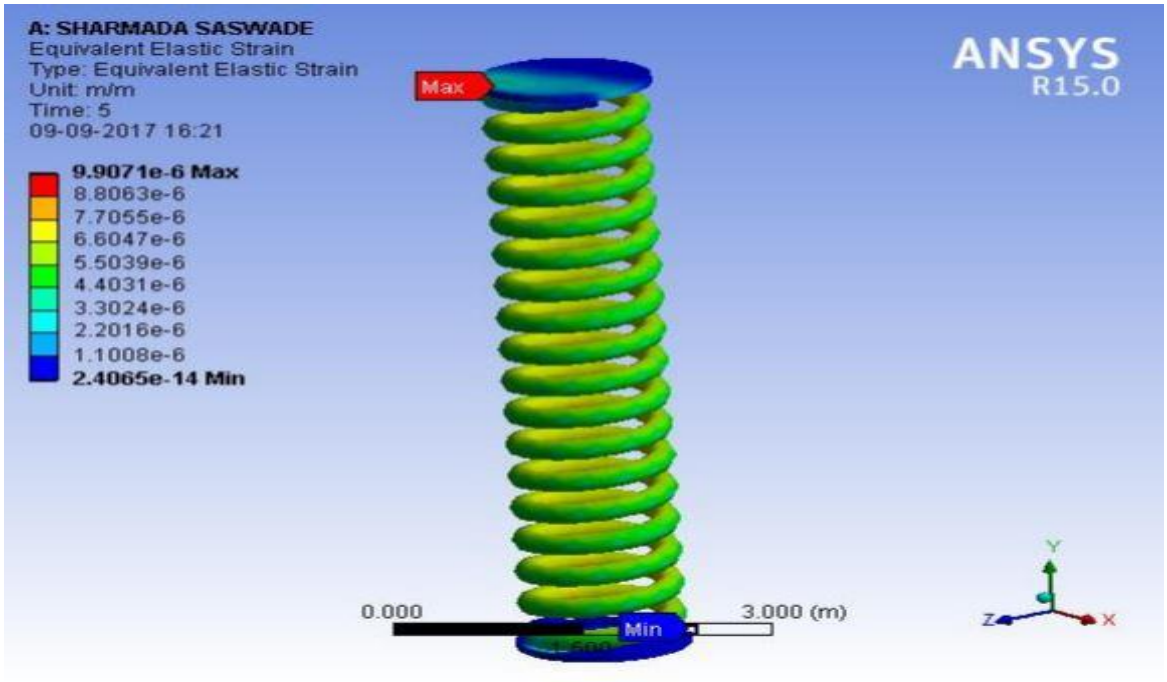


Figure 4: Equivalent Elastic Strain

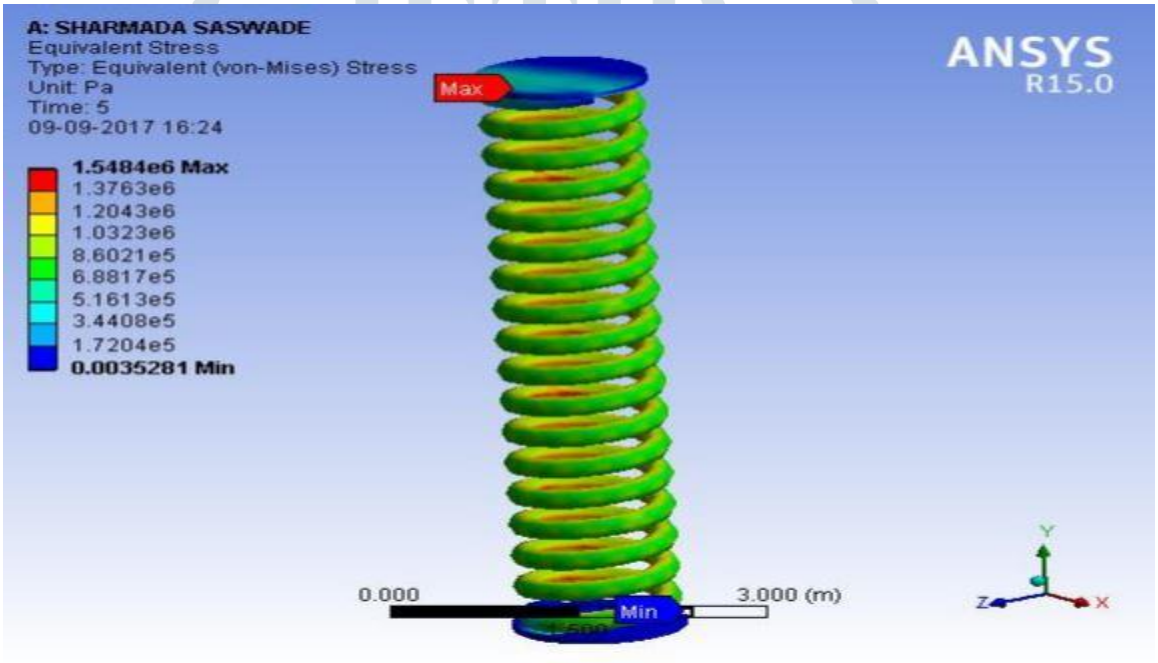


Figure 5: Equivalent Stress

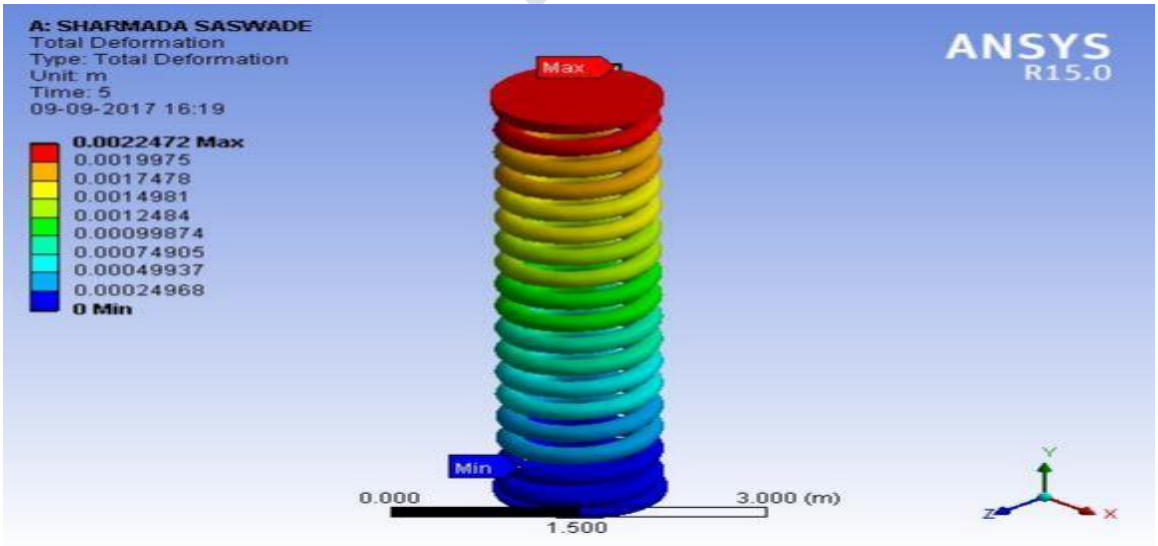


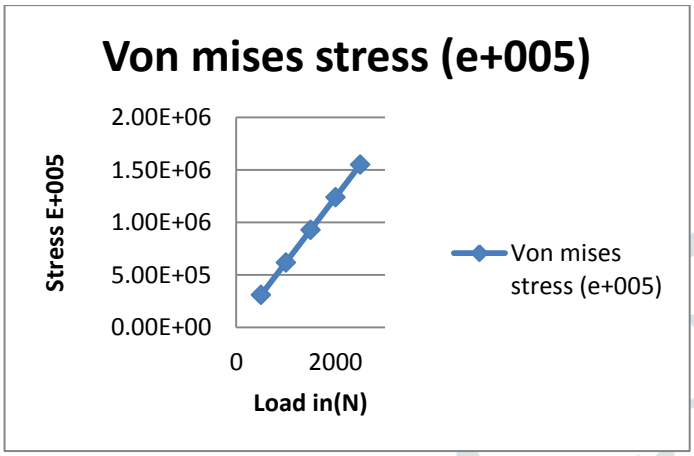
Figure 6: Total Deformation

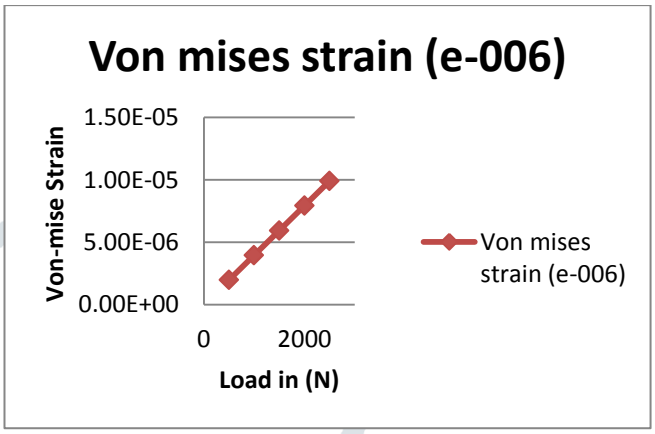
IV GRAPHICAL REPRESENTATION OF ANALYSYS

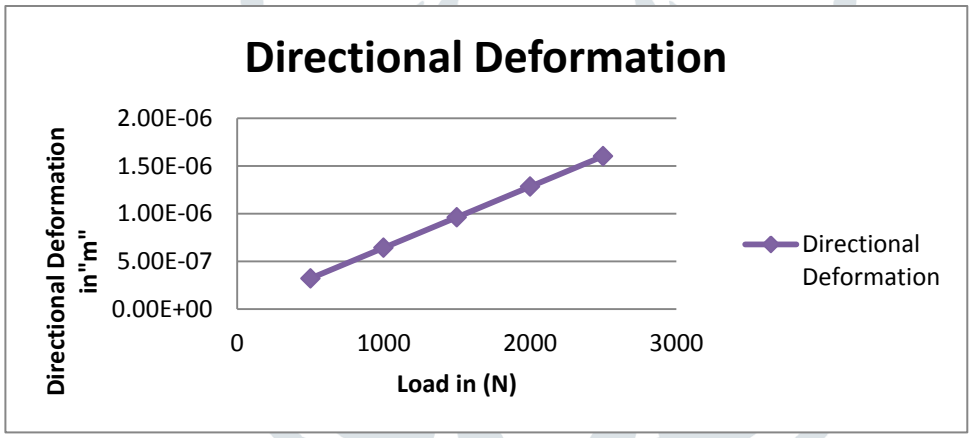
Considering different loading condition for helical spring used in shock absorber of HERO Splendor 110cc. We get following results table with different load condition

Sr. No	Load in (N)	Von mises stress (e+005)	Von mises strain (e-006)	Directional Deformation
1	500	3.10E+05	1.98E-06	3.20E-07
2	1000	6.19E+05	3.96E-06	6.41E-07
3	1500	9.29E+05	5.94E-06	9.61E-07
4	2000	1.24E+06	7.93E-06	1.28E-06
5	2500	1.55E+06	9.91E-06	1.60E-06

Following graph shows the material behavior against load is as follows







V CONCLUSION

The helical coil spring of hard carbon steel for circular cross sections are studied using FEA analysis. The von-mises stress,von-mises strain,total & directional deformation values are obtained. The values of von-mises stress,von-mises strain of structural steel for circular cross sections are determined. Maximum values of above mentioned are as follows.

Sr. No	Maximum Load in "N"	Von-mises stress (e+005)	Von-mises strain (e-006)
1	2500	1.55E+06	9.91E-06

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