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Fabrication and Analysis of Two Wheeler Suspension Coil Spring

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ABSTRACT: A Suspension is mechanical devices used to smooth out or damped shock impulse and dissipate kinetic energy. In, vehicles a problems happens while driving on pumping road condition so the rider feels uncomfortable since the design of spring in shock absorber is very important. In bikes suspension system is based on the coil spring and damper. There are many types of coil spring suspension is used. In this project is to acting the required stiffness spring as per the load on the suspension to reduce the shear stress force variation and deflection of the suspension coil spring to make a comfortable journey. The first spring is acting in the initial load or one person. The second spring is acting in the second load or the second person. The new double spring is designed model is created using modeling software CREO and analysis by ANSYS. Comparison made between default spring and new double spring design

I. INTRODUCTION

A shock absorber or damper is a mechanical device designed to smooth out or damp shock impulse, and dissipate kinetic energy. In the new designed double coil spring shock absorber will reduce stress development and also deflection.

II. LITERATURE REVIEW

Harshal Rajurakar et al. (2016)

Are carried out on modeling, analysis of suspension spring is to replace the existed steel helical spring used in popular two wheeler vehicle. The stress and deflections of the helical spring is going to be reduced by using the new material. The comparative study is carried out between existed spring and new material spring. Static analysis determines the stress and deflections of the helical compression spring in analytical as well as finite element analysis.

Prince Jerome Christopher et al. (2010)

Are analyze the problem happens while driving on bumping road condition. The objective of this project is to design and analyze the performance of Shock absorber by varying the wire diameter of the coil spring. The Shock absorber which is one of the Suspension systems is designed mechanically to handle shock impulse and dissipate kinetic energy. It reduces the amplitude of disturbances leading to increase in comfort and improved ride quality. The spring is compressed quickly when the wheel strikes the bump.

D.Ramajogi Naidu et al. (2018)

Are analyze problems happen while driving on bumpy road condition. The Shock absorber is one of the Suspension systems is designed to handle shock impulse and dissipate kinetic energy. It decreases amplitude of disturbances leading to increase in comfort and improved ride. The spring is compressed when the wheel strikes a bump. The

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compressed spring rebound to its normal dimension which causes the body to lift up. The spring goes down below its normal length when the weight of the vehicle pushes the spring down.

III. ANSYS ANALYSIS

Default spring

$D = 47 \text{ mm}$

$d = 7 \text{ mm}$

pitch = 15mm

Default spring of the bike suspension in non load acting condition diagram is shown Fig 3.1

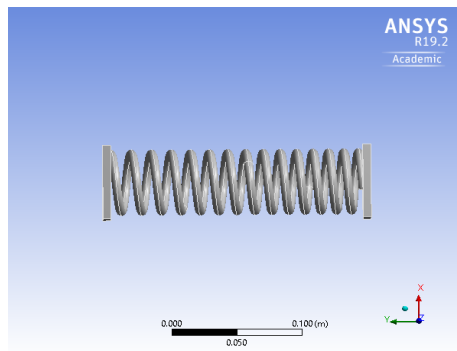


Fig 3.1 Default coil spring

The default spring of the bike suspension in 65kg or 637N weight acting condition diagram is shown Fig 3.2

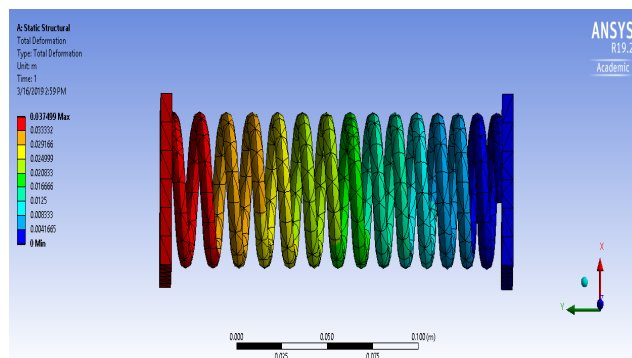


Fig 3.2 Default spring in load

The default spring of the bike suspension in 130kg or 1274N weight acting condition diagram is shown Fig 3.3

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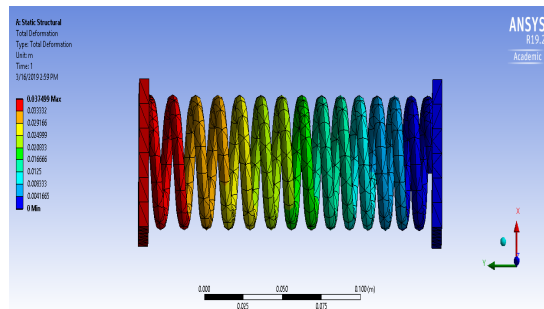


Fig 3.3 Default spring in load

Double spring
D = 35mm
d = 6mm

The new designed double coil spring diagram is shown in Fig 3.6



Fig 3.6 New double coil spring

The new designed double spring of the bike in 65kg or 637N load acting condition diagram is shown Fig 3.7

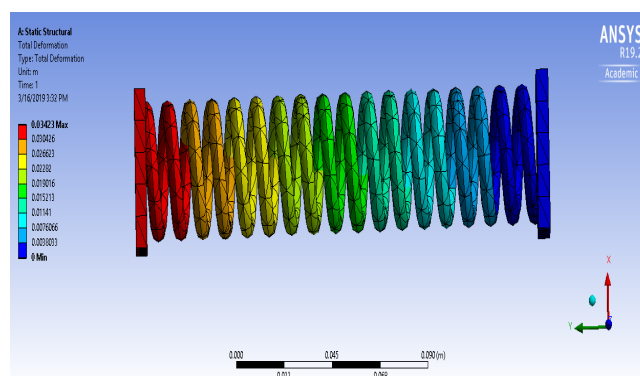


Fig 3.7 New double coil spring in load

The new designed double spring of the bike in 130kg or 1274N load acting condition diagram is shown Fig 3.8

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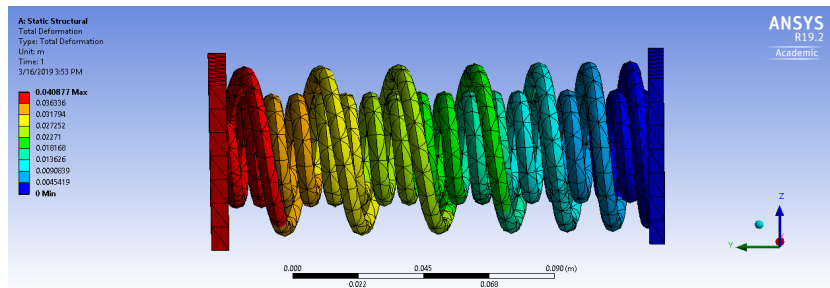


Fig 3.8 New double coil spring in load

Graph for shear stress in the double coil spring of the bike suspension is shown here Fig 3.9

PRACTICAL TESTING

The practical testing for the bike suspension coil spring is done by the Compression Testing Machine has been designed to meet the need for a simple, economic and reliable means to test concrete for compressive test. The deflection of the default and new double coil spring is calculated by the CTM



The value of deflection is calculated for the certain load input .The input values of load in Newton. The hydraulic pump is pumping the oil to the plate to compress the coil spring. The load input is shown by the analog. The liver is to release the oil and lock the machine in required load. Top plate is fixed, it is used to support the coil spring to the another end.

IV. RESULT & CONCLUSION

Table for shear stress and deflection

Load	Springs	Shear stress N/mm ²	Deflection mm	Testing
		Analysis	Analysis	
65kg Or 637N	Default spring S1	303	37	32
	Double spring S2	359	34	25

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130kg Or 1274N	Default spring	607.3	75	70
	S1			
	Double spring	456.39	40.87	20
	S2			

Table 3.1

V. CONCLUSION

The shear stress and deflection of the new double spring suspension is less than default suspension coil spring, therefore the double spring suspension is more comfortable than default spring and the unbalanced force reduced when damping on the road

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