RESEARCH ARTICLE OPEN ACCESS

Modification of a Two Wheeler Suspension System using Fea

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Abstract—
A spring is defined as an elastic body, whose function is to compress when loaded and to recover its original shape when the load is removed. A spring is a flexible element used to exert a force or a torque and, at the same time, to store energy. The force can be a linear push or pull, or it can be radial. In two wheelers we used to see helical suspension at the front and rear tyres on both sides. But the new model bikes are replacing the rear double suspension with the single heavy duty suspension. Our project deals with the design and modification of the suspension system and analyzing that can we replace one heavy duty spring in the place of double springs.
For this we have conducted structural analysis by varying the spring material and keeping base material same. By seeing the results, Comparison is done for four materials to validate better material for suspension system by doing analysis on spring with help of ANSYS software for find out which material is best for the suspension system.
And also we modified the actual model and also conducting the same analysis on it and validating that which model is better.
The modeling done in Creo-5 and analysis is done Ansys package.
Keywords— ANSYS, Creo-5, high carbon spring wire, non ferrous alloy wire & high temp alloy wire.

I. INTRODUCTION

A spring is defined as an elastic body, whose function is to compress when loaded and to recover its original shape when the load is removed. A spring is a flexible element used to exert a force or a torque and, at the same time, to store energy. The force can be a linear push or pull, or it can be radial. The torque can be used to cause a rotation. Springs can be classified according to the direction and the nature of the force exerted by the spring when it is deflected. Helical compression springs are typically made from round wire, wrapped into a straight, cylindrical form with a constant pitch between adjacent coils. Square or rectangular wire may also be used. Without an applied load, the spring's length is called the free length. When a compression force is applied, the coils are pressed more closely together until they all touch, at which time the length the minimum possible is called the solid length.

A shock absorber or damper is a mechanical device designed to smooth out or damp shock impulse, and dissipate kinetic energy.

Description

Pneumatic and hydraulic shock absorbers commonly take the form of a cylinder with a sliding piston inside. The cylinder is filled with a fluid (such as hydraulic fluid) or air. This fluid-filled piston/cylinder combination is a dashpot.

Fig.1 Rear shock absorber

Hydraulic shock absorber monotube in different operational situations:

1) Drive slow or adjustments open
2) How to "1", but extension immediately after the compression
3) Drive fast adjustments or closed, you can see the bubbles of depression, which can lead to the phenomenon of cavitation
4) How to "3", but the extension immediately after the compression

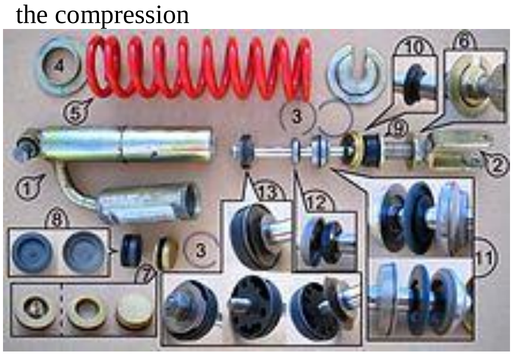

Fig.2 Suspension system parts

II. CREO-5 MODELS

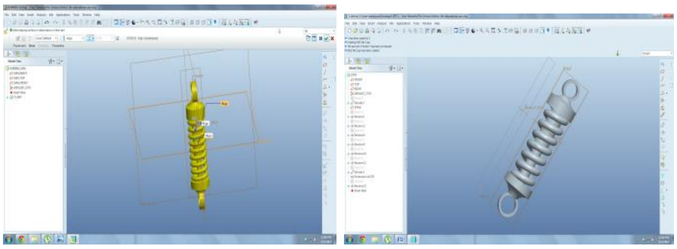

Fig.3&4 Model-1(actual) & Model-2 (Modified)

III. ANALYSIS FIGURES BY ANSYS PACKAGE

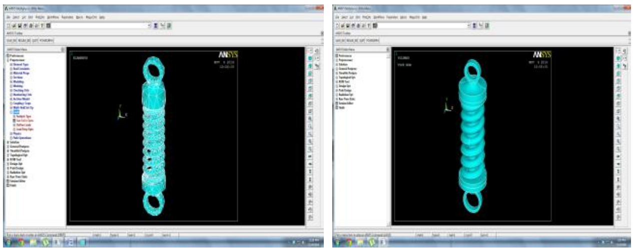

Fig.5&6 Actual meshed model-1& Imported model-2

IV. RESULTS & DISCUSSION

- **Model-1**
- **HIGH CARBON SPRING WIRE**

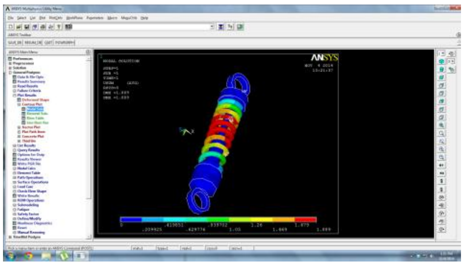

Fig.7 **Deformed shape**

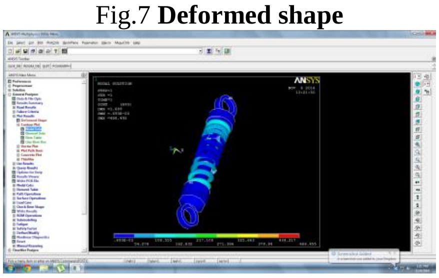

Fig.8 **Stress intensity**

- **STAINLESS STEEL**

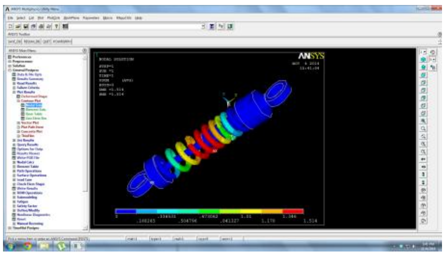

Fig.9 **Deformed shape**

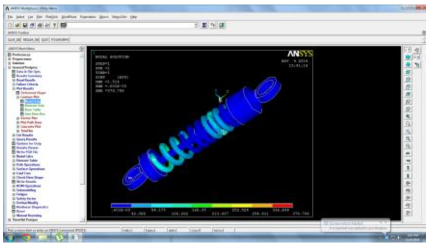

Fig.10 **Stress intensity**

- **NON FERROUS ALLOY WIRE**

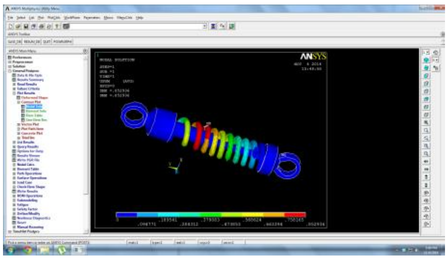

Fig.11 **Deformed shape**

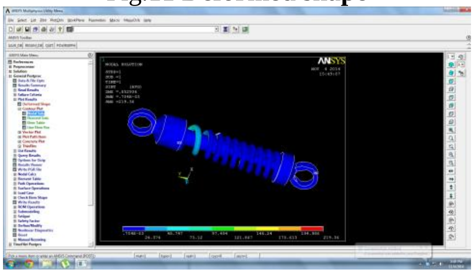

Fig.12 **Stress intensity**

- **HIGH TEMP ALLOY WIRE**

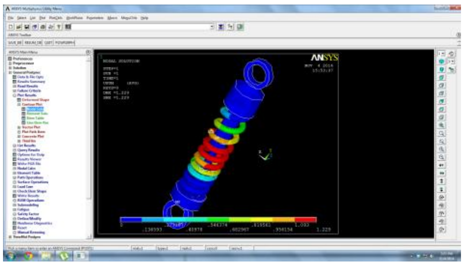

Fig.13 **Deformed shape**

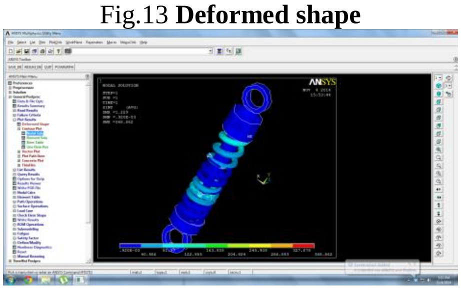

Fig.14 **Stress intensity**

- **Model-2**
- **HIGH CARBON SPRING WIRE**

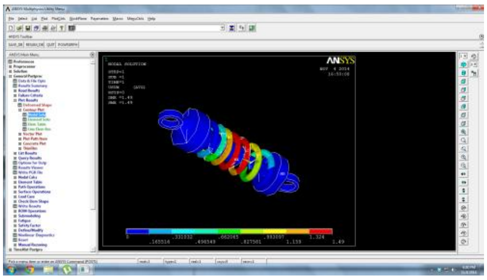

Fig.15 **Deformed shape**

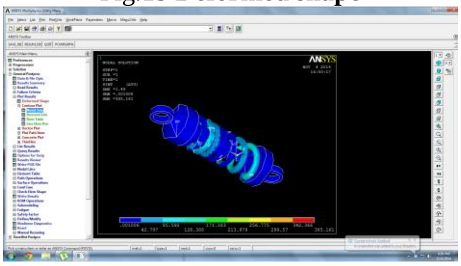

Fig.16 **Stress intensity**

- **STAINLESS STEEL**

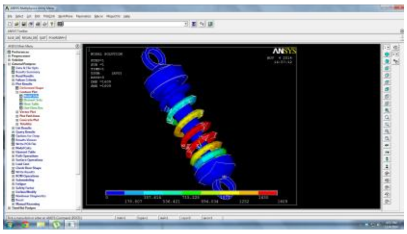

Fig.17 **Deformed shape**

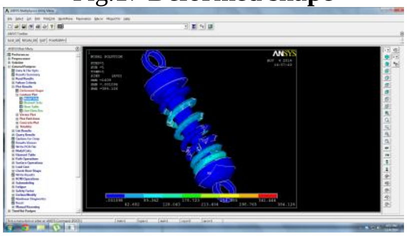

Fig.18 **Stress intensity**

- **NON FERROUS ALLOY WIRE**

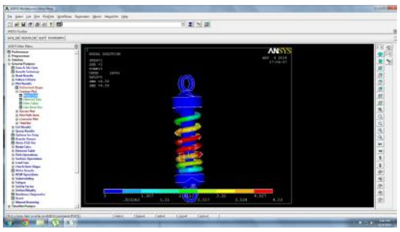

Fig.19 **Deformed shape**

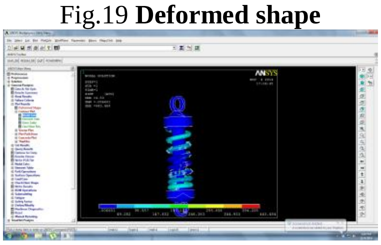

Fig.20 **Stress intensity**

- **HIGH TEMP ALLOY WIRE**

Fig.21 **Deformed shape**

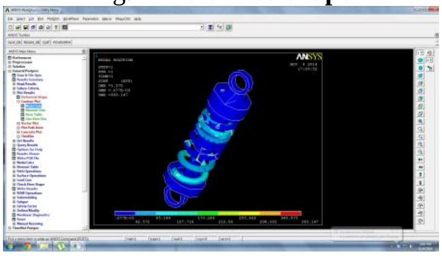

Fig.22 **Stress intensity**

V. RESULTS SUMMARY TABLE

	MODEL-1		MODEL-2	
	DEFORMED SHAPE	STRESS INTENSITY	DEFORMED SHAPE	STRESS INTENSITY
HIGH CARBON SPRING WIRE	1.889	488.495	1.49	385.161
STAINLESS STEEL	1.514	378.786	1.609	384.126
NON FERROUS ALLOY WIRE	.852936	219.36	1.453	383.147
HIGH TEMP ALLOY WIRE	1.229	368.862	1.575	443.484

VI. CONCLUSION:

The project outer line is that modeling by using creo-5 and analyzing by using ansys package of the suspension system.

The two springs are designed with different spring wire diameter and Structural analysis is done on the springs to verify the strength. materials used are HIGH CARBON SPRING WIRE, STAINLESS STEEL, NON FERROUS ALLOY WIRE and HIGH TEMP ALLOY WIRE . By observing the analysis results, the maximum stress and total deformed shape values for non ferrous wire are less than all other materials respective values. So we expected that for two wheeler suspension spring using as non ferrous wire is advantageous than using steel and other materials.

As similar to the above comparison the two models results were compared and by the observation we conclude that model -1 is best model than the model-2 using original model is advantageous.

Future scope:

1. By changing spring dimensions we may obtain best results.
2. By changing the dimensions of the suspension system the new model may be success.

3. By using composite materials we may obtain good results.

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