To Prepare A Test Rig For Suspension System Using Cushion Buffer

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ABSTRACT

Stiffness of spring depends on various characterizes such as spring diameters, grad of material, coil diameter etc. It also alters acceleration, velocity and displacement amplitude and can put occupant into hazardous problems the primary function of suspension system of vehicle should fulfil crusial requirement about stability, safety and manoeuvrability. In this study spring of Maruti Suzuki WagonR as per design consideration will be analysed using finite element analysis and testing will be performed.

Keywords: Suspension system, Cushion Buffer, Urethene, Coil Spring

ARTICLE INFO

I. INTRODUCTION

A spring is an elastic object that stores mechanical energy. Springs are typically made of spring steel. There are many spring designs. In everyday use, the term often refers to coil springs.

When a conventional spring, without stiffness variability features, is compressed or stretched from its resting position, it exerts an opposing force approximately proportional to its change in length (this approximation breaks down for larger deflections). The *rate* or *spring constant* of a spring is the change in the force it exerts, divided by the change in deflection of the spring. That is, it is the gradient of the force versus deflection curve. An extension or compression spring's rate is expressed in units of force divided by distance, for example or N/m or lbf/in. A torsion spring is a spring that works by twisting; when it is twisted about its axis by an angle, it produces a torque proportional to the angle. A torsion spring's rate is in units of torque divided by angle, such as N·m/rad or ft·lbf/degree. The inverse of spring rate is compliance, that is: if a spring has a rate of 10 N/mm, it has a compliance of 0.1 mm/N. The stiffness (or rate) of springs in parallel is additive, as is the compliance of springs in series.

Springs are made from a variety of elastic materials, the most common being spring steel. Small springs can be wound from pre-hardened stock, while larger ones are made from annealed steel and hardened after fabrication.

Some non-ferrous metals are also used including phosphor bronze and titanium for parts requiring corrosion resistance and beryllium copper for springs carrying electrical current (because of its low electrical resistance).

II. PROBLEM STATEMENT

1 The existing spring has certain life span for which its stiffness remains constant along the fluctuating life. Then the spring is recycled to make it again in use. The spring has its certain life span of its 100 percent efficiency but then in terms it decreases.

2. There are various methods that increases the span of spring by overall designing the spring at initial stage, but there aren't methods which can be applied in the mid of its life that increases its span.

A. OBJECTIVES

1 To increase overall damping capacity of spring.
2 To control the stiffness of spring indirectly increasing life.
3 To add stiffness to spring without affecting of spring.
4 To reduce breaking distance of the car.

III. CONSTRUCTION

The waste heat recovery system consists of following components
- Coil spring
- Cushion Buffer
- D.C Motor

- Cam and Follower
- Lippo Batteries
- Gear Mechanism

Working of the setup

Working of setup consists following:

1) Coil spring- A coil spring, also known as a helical spring, is a mechanical device which is typically used to store energy and subsequently release it, to absorb shock, or to maintain a force between contacting surfaces. They are made of an elastic material formed into the shape of a helix which returns to its natural length when unloaded.

2) Cushion buffer- It protects car shock absorber from unpredictable shock and provides sense of stability while cornering. Its main role is to enhance comfort while driving and to make driving safer. Urethane buffer protects shock absorber and extends its durability. It reduces the exchanging cost of expensive shock absorber.

3) D.C Motor- Electric motors revolutionized industry. Industrial processes were no longer limited by power transmission using line shafts, belts, compressed air or hydraulic pressure. Instead, every machine could be equipped with its own power source, providing easy control at the point of use

4) Cam and Follower- A cam and follower mechanism is a profiled shape mounted on a shaft that causes a lever or follower to move. Cams are used to convert rotary to linear (reciprocating) motion. As the cam rotates, the follower rises and falls in a process known as reciprocating motion. The motion of the follower is restricted to a pre-determined pattern by a guide. The follower maintains contact with the cam through the force of gravity or by a spring. The total range of movement produced by the cam is called the stroke.
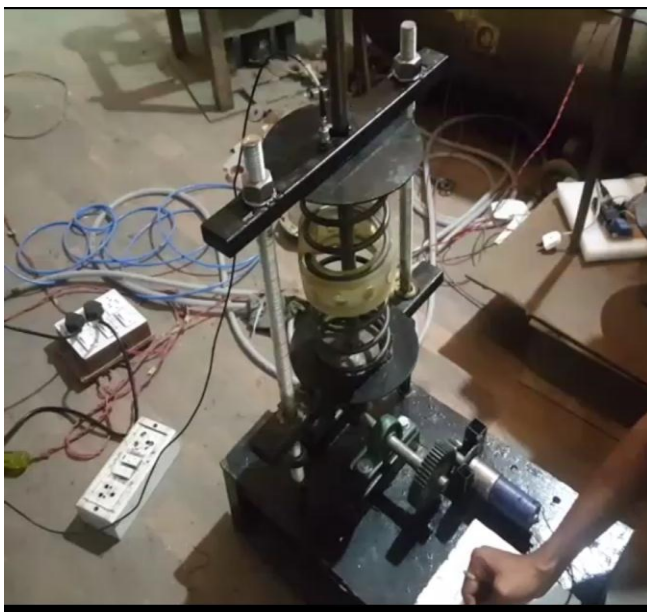

Fig: Setup of suspension system test rig

IV. SPECIFICATIONS

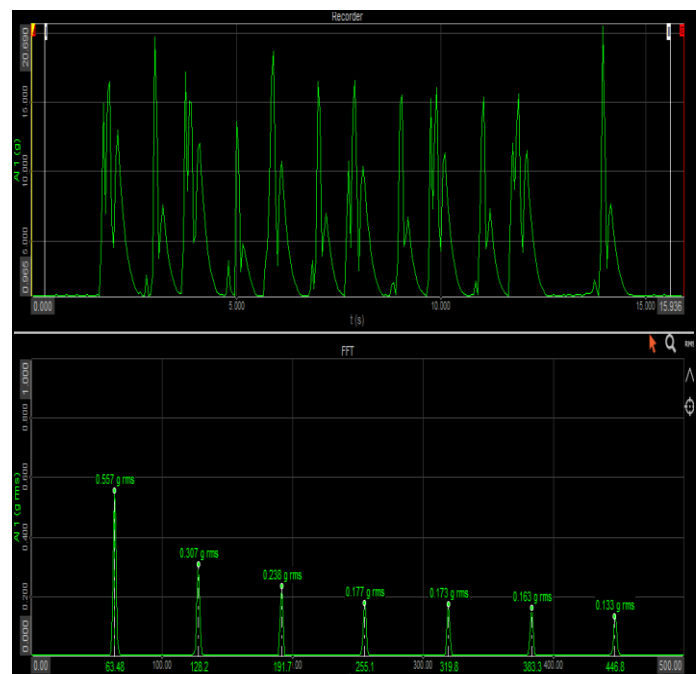| Serial Number	Component	Values
1	Coil Spring	D=102mm d=11mm δ=38mm n=8 G=77KN/mm^2
2	D.C Motor	V=12V Torque-45kg-cm I-900mA W=860gm
3	Cam & Follower	Rb=21.5mm Rn=17mm Rr=12mm R=53mm
4	Lipo Battery	P-5000mAh V=12v n=2
5	Urethene cushion Buffer	D=105mm B=50mm
6	Gear	d=50mm D=100mm t=24 T=50

V. RESULTS

Fig. Experimental Testing Results

VI. CONCLUSION

1) It is seen that our set up gives results when cushion buffer is inserted between the turns of spring. It is also observed that stiffness increases with insertion of the cushion buffer. It can be suggested that spring life will be increased.

2) We also can utilize the piezoelectric energy generated from it in various application. This device can be used to generate and run many accessories and various components that require the electrical energy for operation and also protects shock absorber and extends its durability.

3) It reduces the exchanging cost of expensive shock absorber.

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