

AIR SUSPENSION SYSTEM for VEHICLES IN INDIA

by Ratish Jain, Managing Director, Resistoflex



The conventional leaf springs (L.S.) in the Suspension System of a Vehicle has a load / deflection Curve which has a constant slope. But, with very low available travels and static deflections as also high hysteresis, there are obvious constraints with regard to achieving comfort levels inside the vehicle. In spite of shock absorbers used in "Tandem" the leaves of the bundled spring are subject to fatigue as well as impact stresses due to which vibrations and shock are routinely experienced.

Air Springs eliminate static compression and maintain spring rate proportional to varying load conditions result in low & constant natural frequency and hence optimal ride comforts. Shock absorbers in tandem provide protection from impact loads.

The vertical, longitudinal, lateral, cornering forces and rolling moments are manifestly induced in any moving vehicle due to surface roughness, obstacles, acceleration / deceleration due to speed maneuvering / braking etc, gradient changes and turning operations. All these phenomena exist in vehicles whether L.S. or A.S. suspended. However, the vertical loads really get taken care of much better by Air springs in comparison with leaf springs.

There has been a metamorphosis in the location of Air Springs in the vehicle suspension systems. Leading player(s) in the field adopting "parallelogram" design concepts and characteristics of the "Parabola" with its consistency of equation co-relating displacement in

two axes perpendicular to each other. The general framework of rules do not permit any major deviations to existing chassis/frame, involving relocation of holes, welding etc.

Guided by the essentiality of providing "PRECISE AXLE LOCATION" and excellent roll stabilization "PARABOLIC Spring (Parabolic Control Arm) has been incorporated in our design. These springs, one on each side in the rear axle, precisely located with precision tailored clamping using the axle fastening techniques cater to the longitudinal forces.

Parabolic Springs are located with only one pivot point, assuring higher durability due to less stress on material than in leaf springs. They require no space behind the axle. The deflection between full load and tare load is very small. They permit a precise location to take a lateral member forming a stable platform – FREE from any chassis strains to house the all important A) Air Springs B) Levelling valves and C) Shock absorbers. Thus, the Air Springs are offered distortion free vertical movements for their optimal performance.

Now to take care of "Lateral Forces" a Track bar/Panhard bar has been introduced between the left and right chassis frame members, which would prevent them from moving towards each other by relieving stresses /strains with judicious end connections made of specially selected ball joints capable of high adjustments. These unique locations ensure quicker stabilization actions get activated. This also accords protection against bump-stop contact when any large obstacle comes by way of either right or left side wheels.

The significant point of the design, is that out of the axle forces; while longitudinal stresses are to be handled by the parabolic spring, the lateral forces (as resolved in the parallelogram principle of resolution of forces in any specific plane) are conveyed to the "Torsion Bar" arrangement through the unique system of lever stabilizer mechanisms.

It may be appreciated from above, that every effort has been made to cater to the forces relative to the horizontal plane at the level of the tyre contact with the road surface. However, the C.G. of the vehicle being above the ground level, the body of the vehicle would experience "rolling motion" about the longitudinal plane containing the C.G., as also "pitching motion" about the lateral plane containing the C.G. (more predominant in the overhang areas of the vehicle). These are existent in the leaf sprung vehicles also. In our design, an Anti Roll bar has been well engineered; into the overall system to take care of these phenomena; to increase comfort levels.

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- BETTER RIDE QUALITY & SAFE HANDLING
- EXCELLENT ROLL STABILIZATION

For further details please contact :

Resistoflex Dynamics Pvt. Ltd.

B-103, Sector-5, Noida – 201 301, Web : www.resistoflexindia.com,
E-mail : sales@resistoflexindia.com, Fax No. (0120) 2421417, (011) 26916075,
Tel : (0120) 2420321 – 22, 2420315, Mob. 9818200361