

## Composite 'C' Springs for Anti-Seismic Building Suspension: Positioning 'Virtual Center of Pendulation above Gravity Center'

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**Abstract :** Now that weight saving is mandatory, to author best knowledge composite springs, that we have invented, are best choice for automotive suspensions, against steel. So, we have created a Joint Ventures called S.ARA, in order to mass produce composite coils springs. Start of Production of composite coils springs was in 2014 for AUDI. As we have demonstrated, on the road, that composite springs are not a sweet dream. The present paper describes all the benefits of 'C' springs and 'S' springs for high performance vehicles suspension, for rocket stage separation, and for satellite injection into orbit. Developing rocket stage separation, we have developed for CNES (Centre National d'Etudes Spatiales) the following concept. If we call 'line of action' a line going from one end of a spring to the other. Our concept is to use for instance two springs inclined. In such a way that their line of action cross together and create at this crossing point a virtual center well above the springs. This virtual center, is pulling from above the top stage and is offering a guidance, perfectly stable and straight. About buildings, our solution is to transfer this rocket technology, creating a 'virtual center' of pendulation positioned above the building center of gravity. This is achieved by using tilted composite springs benches oriented in such a way that their line of action converges creating the 'virtual center'. Thanks to the 'virtual center' position, the building behaves as a pendulum, hanged from above. When earthquake happen then the building will oscillate around its 'virtual center' and will go back safely to equilibrium after the tremor. 'C' springs, offering anti-rust, anti-settlement, fail-safe suspension, plus virtual center solution is the must for long-lasting, perfect protection of buildings against earthquakes.

**Keywords :** virtual center of tilt, composite springs, fail safe springs, antiseismic suspension

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