## Lightweight Components



*Ride Performance innovation, accelerated*<sup>™</sup>



# Forward thinking. Forward moving.

### Where transportation goes for innovation

A vehicle's weight has a direct impact on its fuel consumption and, therefore, its pollutant emissions, leading OEMs to strive to make vehicles lighter. Decreasing the weight of the components is one way to solve the overall weight concerns, which is why Tenneco has made the development of lightweight components a priority.



Tenneco's lightweight initiative has been focused on two key areas – downsizing and material substitution.

Downsizing has allowed the company to produce steel double-tube and mono-tube dampers which are able to fulfill the requirements of a range of applications without a cost penalty. This effort was successfully achieved through the use of adapted valve systems, optimized internal components and new tube forming techniques able to guarantee structural integrity. For strut applications, normal steel can be substituted by high strength steel with variable wall thickness. For mono-tube dampers there are several different options, including high strength steel or aluminum base assemblies. In addition plastic is used for several add-on and modular components, enabling weight reductions of up to 30% within market defined cost targets, without sacrificing strength or functionality.

By developing adapted surface treatments, tube forming and new joining processes simultaneously with the design, generic concepts have been developed which match or exceed the performance of traditional steel dampers and resolve the technological challenges sometimes linked to the use of light metals and plastics.



### LIGHTWEIGHT COMPONENTS

Steel Hollow Rod – The optimal weight/cost ratio solution, without sacrificing strength or performance



Variable Wall Thickness Reserve Tube – A high strength steel tube, processed to a reserve tube with variable wall thickness through the development of efficient, high volume forming processes



Plastic Spring Seat – Light and cost-effective plastic spring seat, realized through the use of high-tech glass fiber reinforced

plastic materials in combination with a geometry, optimized for both strength and process performance



Aluminum Base Assembly – Tube and base cup are integrated through the use of an efficient aluminum impact extrusion process



Joining Technologies – Alternative joining technologies are being developed for joining of components out of different materials without weakening the base materials and providing even more design freedom



### Partnership Built on Performance

At Tenneco, we don't simply provide a product. We provide a partnership taking into account customers' entire systems, their unique needs and applications, technology requirements, market challenges and goals. With our lightweight components and our complete line of ride performance solutions, we offer the partnership that drives the innovation that maximizes performance and enables true ride control.

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### **PIONEERS IN RIDE PERFORMANCE**

At Tenneco, innovation is a hallmark of everything we do. In our advanced ride control technologies and solutions. In our unique, total-system integration expertise and approach. In our commitment to partnership and collaboration. We're always looking beyond the technology horizon to foresee and develop the next-generation ride performance solutions that accelerate our customers' success and keep them moving toward the future.

From development through delivery and beyond – we help our partners drive transportation innovation, full speed ahead.

### **TENNECO IS EVERYWHERE OUR CUSTOMERS NEED US**

Our reach is global, but our focus is local, helping customers in each region adapt our global capabilities and technologies for local applications.

- Nearly 25,000 employees worldwide
- 89 manufacturing facilities
- 14 state-of-the-art research and development centers
- 3 dedicated research and development centers for ride performance engineering

### Markets served:

- Light vehicle
- Motorcycle
- Bus and truck
- Axle suspension
- Cabin suspension
- Seat suspension



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