

Optimized dampers

BWI's technology development supervisor explains his team's latest advances in optimizing damper design weight and performance

Chassis experts at BWI Group are working on innovative technologies that improve suspension damping and reduce the mass of the dampers. In terms of functionality, BWI dampers can filter out the peak forces transmitted from the suspension into the vehicle's body to eliminate the effects of end-of-travel load spikes. In terms of mass reduction, BWI can deliver a variety of options, using lightweight materials or optimized steel designs.

Dominik Kasprzyk, BWI Group's technology development supervisor, gives an update on how his team's work on mass reduction is advancing.

A few years ago you proposed lightweight suspension strut reservoir cylinder tubes that were made with Variable Wall Thickness (VWT) technology. Can you briefly remind us of its benefits?

In 2013 we started producing VWT reservoir tubes with a pull-broaching process that yields a mass reduction of about 15%.

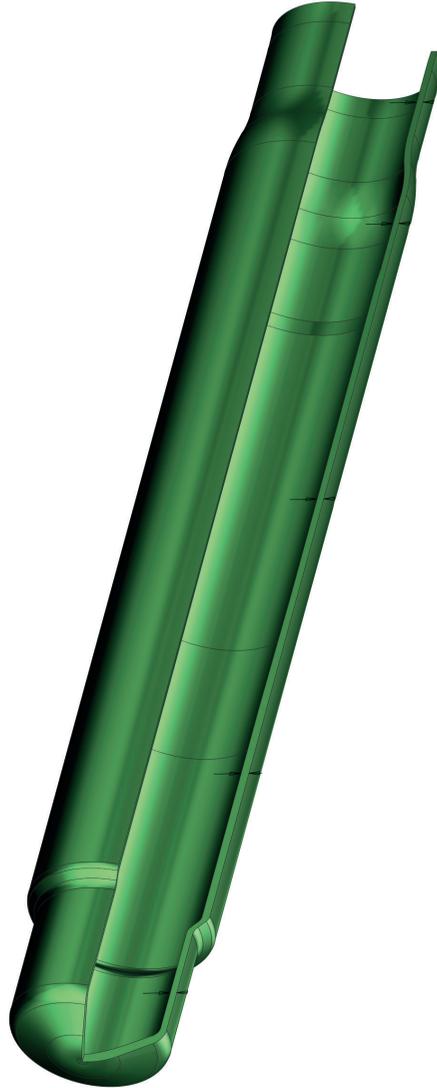
15%? That's a notable improvement.

Yes, it is, but we weren't satisfied. We knew we could do better, especially for the reservoirs designed with lower neck-down. Our engineering department worked on all elements of design and process. The improved engineering techniques were dramatic enough that we patented a new process that we call Variable Wall Thickness Plus. With VWT+, by thinning the wall in the lower neck-down area, the same tube that was mass-reduced by 15% with VWT is reduced by 22%.

But it doesn't end there. When specifically considering the McPherson strut design, VWT+ tailors the properties of the main damper reservoir tube so that not only is its mass reduced, but it can also support all structural suspension loads. This tailored properties approach means that the thickness of the tube varies along its length, tailored to match the stress levels at each point. Excess material can be removed at points with lower stress without any deterioration in the overall tube strength and without reducing fatigue life.

Does this process work with only one special style of reservoir tube?

The VWT process can be applied to different kinds of cylinder designs, and so far with this process we have produced various reservoirs with a cumulative total of over six million parts. But the optimum mass saving is obtained when the process is applied to classic, straight cylinder tubes. For tubes that use a lower neck-down – a feature required for front suspension knuckle pinch-bolt attachments – the mass improvement is diminished.



So beyond VWT, now we also offer VWT+ to maximize savings in mass. We can choose the option that will be the most beneficial for the customer.

Where's this technology going? Who's going to use it?

Customers for products made with VWT+ technology are not limited to those who want to optimize a vehicle in terms of mass. There are many clients for whom this is not a priority, and for them VWT+ technology can bring other advantages. A thinner wall reservoir tube assembly means that the same external dimensions as a standard tube are retained, but with increased internal volume compared with a damper with a constant wall thickness in the reservoir tube assembly. This design ensures an appropriate oil volume, especially in the area of the lower valve.

VWT+ technology is a unique solution for suspension designers seeking reliable, lightweight damper tubes that can be customized to any design of McPherson strut. The combination of potential double-digit percentage mass reduction, tailored properties, increased damper volume for hydraulic features, and BWI's production experience, mean that VWT+ technology should be included in your next McPherson strut.

ABOVE: A tube with Variable Wall Thickness Plus (VWT+), which is 22% lighter than a tube with constant wall thickness

ABOVE RIGHT: Dominik Kasprzyk, PhD, BWI Group's technology development supervisor

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