

Precision powertrain springs

Efficient and compact innovative springs and stampings help propel the next generation of performance and low-emission transmissions

▶ There are multiple innovative technologies to assist in achieving the increasingly challenging emissions/CAFE standards that automotive OEMs and their suppliers are facing globally, including alternative fuel/powertrain technologies such as electric, hybrid and other zero-emissions vehicles. However, these technologies – while promising – still have relatively low market share and adoption rates, mostly due to financial considerations, degrees of government support and lack of infrastructure.

Increasingly, automotive OEMs and their suppliers have shifted their approach to include breakthroughs and incremental advances in automatic transmissions for gasoline and diesel passenger cars and light trucks to achieve these challenging levels of fuel economy faster and more economically.

The automotive industry has been abuzz with highly publicized collaborative transmission developments among automotive OEM competitors and some of their suppliers. GM and Ford have been public about their 9- and 10-speed automatic transmission collaboration, Fiat Chrysler Automobiles and its Tier 1 supplier ZF have partnered on the new advanced 9-speed

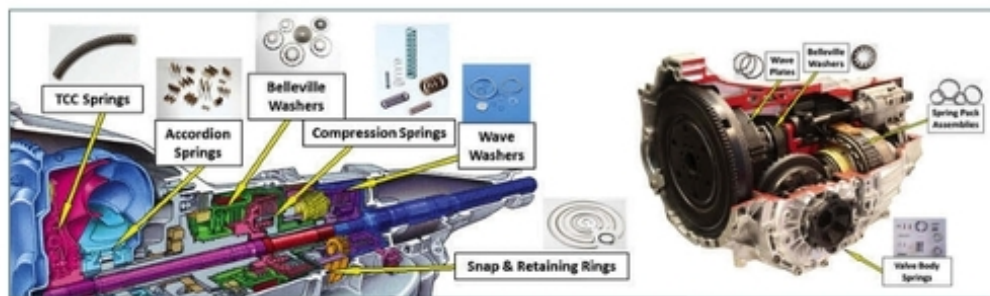


Figure 1: Illustration and example of assembled automatic transmission

transmission designs, while Daimler and Renault-Nissan have been jointly designing advanced transmissions such as the 9-speed. These extraordinary collaborations exemplify the opportunities and challenges these advanced transmissions present to the industry as a whole in meeting regulatory mandates on schedule.

As a result, the trend has been for OEMs and suppliers in the transmission market to partner with key component manufacturers to customize solutions that enable high-performing, super-efficient and more compactly packaged transmissions. Examples of these leading pioneering technology companies include Associated Spring (established in 1857) and Seeger-Orbis (established in 1917), both business units of Barnes Group (NYSE: B) that have a rich

history of providing critical engineered powertrain springs and other precision solutions (springs, stampings and retaining/snap rings) to many of the industry's top 10 global OEMs and their suppliers – some for more than 80 years.

Associated Spring has been developing an advanced portfolio of unique innovative precision springs, washers and rings that are vital to the performance of each customer's 9- and 10-speed transmission configurations – targeted launch is scheduled for 2016 and beyond.

Since its first spring patent in 1866, Associated Spring has invented, or first adopted and refined, many technologies for the spring industry, such as micro-peening, heat induction and superfinishing. The company is constantly pushing the innovation and technology envelope to reach new performance levels for critical applications, such as advanced automatic transmissions. With manufacturing facilities in the USA, Germany, China, Singapore, Brazil and Mexico, Associated Spring and its sister company Seeger-Orbis have an overlapping and complementary presence spanning North and South America, Europe and Asia (with additional global growth anticipated) to better serve the needs of the global transmission market.

Figure 2 illustrates synergetic precision components that Associated Spring and Seeger-Orbis supply to the automotive transmission market. With Associated Spring and Seeger-Orbis offering a full-service portfolio, from engineering to manufacturing, across the widest range of automatic and manual transmission engineered components, their customers benefit by harvesting the depth and scope of the two companies' combined expertise while reducing the logistical costs and supply-chain management in the complex transmission market.

In conclusion, critical transmission performance characteristics are enabled by Associated Spring's and Seeger-Orbis's innovations in many engineered components, such as valve body springs, Belleville and wave washers, as well as retaining and snap rings, all of which are integral to making cost-effective, optimized and global vehicles that are capable of meeting the environmental and economic challenges of the 21st century. ©



Figure 2: The various synergetic transmission components that are supplied by Associated Spring (left) and its sister company, Seeger-Orbis (right)

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