

## BorgWarner Presents Highly Adaptable P2 Hybrid Modules and Innovative Variable Spring Absorber at CTI Symposium in Berlin

- Broad solution portfolio for combustion, hybrid and electric vehicles shown at international transmission expo
- BorgWarner experts present high-performance hybrid technologies
- Transmission technologies enable higher efficiency and performance for all propulsion architectures

Auburn Hills, Michigan, December 04, 2017 – BorgWarner is presenting its advanced transmission technologies at the 16<sup>th</sup> International CTI Symposium in Berlin from December 4 to 7, 2017. The company's exhibits will include the latest solutions for combustion, hybrid and electric vehicles. At the symposium, BorgWarner experts will hold a talk on the subject of high-performance P2 hybrid modules. In addition, visitors to the trade fair accompanying the symposium will have the opportunity to see BorgWarner's Variable Spring Absorber (VSA), an innovative enabler for further downsizing and cylinder deactivation as well as the company's tried-and-tested friction plates.

"The future of mobility will be extremely varied – depending on the task at hand, there will be all kinds of propulsion architectures," said Robin Kendrick, President and General Manager, BorgWarner Transmission Systems. "No matter what the application is, we and our state-of-the-art transmission technologies are ready to support our customers in delivering the fun-to-drive, clean and efficient vehicle of the future."

For P2-type hybrids, where the engine can be decoupled for limited pure electric driving, BorgWarner has developed its P2 hybrid modules. Available as both on-axis and chain-driven off-axis designs, this advanced solution combines a high-voltage traction motor, an engine disconnect clutch, a clutch control module and a dual-mass flywheel within a compact package nested inside the motor. After the recent Sevcon acquisition, BorgWarner is able to provide power electronics for the modules as well. Placed between the engine and transmission, BorgWarner's

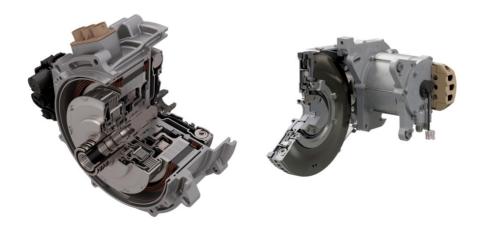
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P2 module is compatible with all transmission architectures, including manual transmissions. In addition, the system works with both 48V mild hybrid power supplies and conventional high-voltage hybrid systems. The company's technology is therefore an enabler for cost-efficient electrification that follows the predominant trend in industry and saves fuel.

By adapting its absorption performance on the fly, BorgWarner's VSA system is able to facilitate a high degree of downsizing and cylinder deactivation for enhanced efficiency. Previously, high levels of downsizing were deemed undesirable as the resulting significant torsional vibrations coming from the engine exceed the performance limits of current dual-mass flywheel absorption systems. As these vibrations can be felt by the driver, they may have a negative impact on the driving experience. Positioned directly in front of the transmission input shaft, BorgWarner's VSA is able to alter the frequency of its spring-mass system to absorb a wide variety of vibrations while driving, thus reducing the minimum engine speed at which cylinder deactivation is viable. Depending on the drive cycle and the deactivation strategy, this may result in fuel savings of 3 to 7 percent.

## **About BorgWarner**

BorgWarner Inc. (NYSE: BWA) is a global product leader in clean and efficient technology solutions for combustion, hybrid and electric vehicles. With manufacturing and technical facilities in 64 locations in 17 countries, the company employs approximately 27,000 worldwide. For more information, please visit borgwarner.com.



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BorgWarner experts present the company's latest transmission technologies for clean and efficient vehicles of tomorrow, including innovative on- and off-axis P2 modules, at the 16<sup>th</sup> International CTI Symposium in Berlin.

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