



BorgWarner Develops Technologies Focusing on Global Energy Efficiency Trends

- *Portfolio encompasses wide range of propulsion systems for combustion, hybrid (HEV) and electric (EV) vehicles*
- *Cars, SUVs and heavy-duty vehicles benefit from the company's clean and energy-efficient technology solutions*

São Paulo, Brasil, August 29th, 2018 – Focusing on energy efficiency, BorgWarner develops vehicle propulsion technology solutions that actively contribute to the evolution of the global automotive industry. The company's broad product portfolio meets the demands of automakers looking for efficiency and performance with cutting-edge propulsion systems.

“As mobility continues to evolve, we are seeing a wide variety of systems, including highly efficient combustion engines, different hybrid architectures and pure electric propulsion systems,” said Frédéric Lissalde, President and Chief Executive Officer, BorgWarner. “Our expertise in technologies such as eGearDrive® transmissions, electric motors, P2 hybrid modules and eBooster® electrically driven compressors make BorgWarner a leader in developing clean and energy-efficient propulsion systems solutions for the industry.”

With more stringent global emissions standards, the demand for hybridization is increasing. As a result, several hybrid propulsion architectures, from P0-type hybrids (where the electric motor is connected to the engine through the front-end accessory drive belt) to P4-type hybrids (where the combustion engine and e-motor drive different axles) are gaining momentum. BorgWarner's comprehensive hybrid portfolio covers all types of hybrids and power levels from 48-volt mild hybrids to high-voltage plug-in hybrids.

In addition to advanced technologies for combustion vehicles and HEVs, BorgWarner's growing product range covers virtually all areas of electric propulsion—including electric motors, transmissions and power electronics—to support automakers around the world on the way to a zero-emissions future.

eGearDrive® Transmissions

Due to its compact, lightweight design and highly efficient gear train, BorgWarner's eGearDrive transmission contributes to extended battery-powered driving range. In addition to achieving high torque capacity, the technology can handle high input speeds of up to 14,000 rpm and offers a wide range of reduction gear ratios, resulting in optimum acceleration for a variety of engine sizes.

High Voltage Hairpin (HVH) Electric Motors

BorgWarner's versatile HVH410 and HVH250 electric motors deliver industry-leading power and torque densities with up to 300 kW (402 HP) of power and peak efficiency above 95 percent. HVH410 electric motors offer maximum torque of 2,000 Nm for hybrid and electric applications, while HVH250 electric motors offer maximum torque of 425 Nm.

S-wind Technology

Automotive News awarded BorgWarner with a prestigious 2018 PACE Award for its groundbreaking S-wind wire forming technology for electric motors and alternators. The game-changing manufacturing process enables high-volume production of high-voltage electric motors up to 350 volts. Already in production on a 12-volt alternator, BorgWarner expects to launch the technology in a first-of-its-kind 300-volt S-wind motor for an on-axis P2 hybrid vehicle in late 2019.

P2 Module for HEVs

Available in both on- and off-axis configurations, the company's highly flexible technology can easily be implemented in an existing drivetrain, offering pure electrical driving as well as hybrid features such as stop/start, regenerative braking and complementary electric propulsion. In addition, both configurations of BorgWarner's P2 module allow significant reductions in CO₂ emissions with low additional costs compared with other hybrid architectures.

eBooster® Electrically Driven Compressor

BorgWarner's 48-volt eBooster electrically driven compressor is in the market and on vehicles now. The technology is benefiting commercial engines up to 5 liters, and a larger model is under development for engines up to 13 liters. Matched with a BorgWarner-supplied turbocharger, our eBooster technology delivers boost on demand until the turbocharger takes over, improving boost at low engine speeds and eliminating perceptible turbo lag. The technology enables 6-cylinder engines to deliver the same performance and even more fun-to-drive

experience as much larger conventional V8 engines, improving fuel efficiency by 3 to 5 percent in combustion and hybrid vehicles.

Electric Drive Module (eDM)

BorgWarner's integrated eDM combines its eGearDrive transmission with an HVH250 motor to provide primary or secondary propulsion for battery-powered and P4 hybrid vehicles. The integrated design of the electric motor and transmission provides automakers with class-leading power in one compact, easy-to-install, high-efficiency solution.

High-speed (HS) Starter Motor

BorgWarner's HS starter motor offers one of the best weight-to-power ratios on the market. It is capable of accelerating the combustion engine from 0 to 350 rpm in less than 0.5 seconds, providing a significant reduction of emissions during engine start-up. Weighing roughly 10 percent less than the previous generation, the new starter motor can reach up to 1.4 kW of power.

Integrated Belt Alternator Starter (iBAS)

BorgWarner's iBAS enables basic hybrid features such as start/stop, regenerative braking and complementary electric propulsion, providing more power, efficiency and functionality.

High-voltage Cabin Heaters

BorgWarner's advanced heating solution quickly warms the cabin and defrosts windows for maximum comfort and driving safety. The technology offers excellent heat transfer and dual-zone functionality, allowing the precise and quick delivery of individual temperatures for the driver and passengers, and eliminating the noise and waste caused by single-zone heaters.

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 66 locations in 18 countries, the company employs approximately 29,000 worldwide. For more information, please visit borgwarner.com.



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BorgWarner's extensive product portfolio improves energy efficiency, offering clean technology solutions for combustion, hybrid and electric vehicles around the world.

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