

News Release



BorgWarner's VCT Technology with Mid-position Lock Helps Improve Fuel Economy for Hyundai's Gamma II Engine

- *Combined technologies enable late intake valve closing strategies to improve fuel economy*
- *Robust mid-position lock technology provides extended range of authority and passive control*
- *Integrated hydraulic center bolt valve simplifies engine production*

Auburn Hills, Michigan, April 23, 2018 – BorgWarner's latest variable cam timing (VCT) system delivers improved engine efficiency and fuel economy for the new Hyundai Gamma II engine. For the engine's intake valve timing, BorgWarner supplies a variable force solenoid (VFS) and patented passive torsional assist (TA) phaser with mid-position lock (MPL) and integrated center bolt hydraulic control valve. For exhaust valve timing, the company supplies the VFS and TA phaser with integrated center bolt valve. The 1.6-liter I4 gasoline engine launched in the Kia K3 Forte/Cerato and is expected to power a growing number of vehicles for markets in South Korea, China and North America over the next few years.

"The combination of our TA phasers with MPL technology enables automakers to employ late intake valve closing strategies for increased fuel economy," said Joel Wiegert, President and General Manager, BorgWarner Morse Systems. "Following the success of our VCT technology in the Lambda II engine, we are proud to provide localized manufacturing and expand our relationship with Hyundai with this new Gamma II engine program. As more customers realize the ease of integration and the fuel economy improvements this technology offers, we expect demand for our MPL technology to grow substantially in the next few years."

Using BorgWarner's variable force solenoid, TA phasers utilize oil pressure and cam torque energy for phasing. Its patented MPL technology allows an increased range of camshaft positioning with a default stop at an intermediate position within the expanded range of travel. Unlike competitive models that require active control to return to the default position and relock,

the passive MPL technology ensures failsafe return to the mid-park position for reliable engine starts in any operating condition. The integrated hydraulic center bolt valve simplifies engine production on the assembly line.

For Hyundai's Lambda II engine, BorgWarner supplies its patented, compact cam torque actuated (CTA) MPL technology with integrated center bolt hydraulic control valve as well as its VFS.

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 17 countries, the company employs approximately 29,000 worldwide. For more information, please visit borgwarner.com.



Combining BorgWarner's TA phaser with MPL technology enables automakers to employ late intake valve closing strategies for improved fuel economy.

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