TorqTransfer Systems

**KEY BENEFITS**

- better fuel economy
- reduced emissions
- great performance
TorqTransfer Systems has a long and proud legacy of product innovation. Our history began over 100 years ago with Warner Gear and continued on to production of drive axles, manual and automatic transmissions. Today, we continue that tradition of innovation, strengthened by the acquisition of Haldex Traction Systems in 2011, with complete AWD systems and controls including transfer cases, actively controlled all-wheel drive couplings as well as hybrid and electric drive systems. In addition, TorqTransfer Systems has developed a range of advanced axle technologies, including integrated rear drive modules, driveline disconnect systems, electronic limited-slip differential and torque vectoring solutions.

**SIGNIFICANT INDUSTRY FIRSTS INCLUDE:**

- Active On-Demand AWD Featured in the Torque-On-Demand Transfer Case (1995)
- Active Twin On-Demand AWD Rear Drive Module (2000)
- Front-Wheel Drive Electronic Limited-Slip Differential (2013)
Front-Wheel Drive/
All-Wheel Drive

The FWD AWD product portfolio provides the widest range of electronically controlled on-demand AWD couplings and integrated rear drive modules. Both electro-hydraulic and electro-magnetic clutch actuation technologies deliver the required vehicle traction and handling performance. BorgWarner wet friction technology and manufacturing provides efficient and smooth torque transfer.

- Pre-emptive actuation and immediate response
- Light weight and high efficiency
- Available driveline disconnect variant
- Unique electro-magnetic actuation for optimum NVH
- Cost effective and compact designs (100 & 120 series)
- Self-contained oil sump for ease of integration
- Compact and rapid electro-mechanical actuation
- High actuation force and position stable
- Enables optimal driveline system disconnect performance

Integrated Drive Modules

- Active oil sump management for optimum efficiency
- Integrated compact design and low weight for enhanced fuel economy
- Modular design for eLS and torque vectoring variants
- High efficient two-wheel drive mode for improved fuel economy
- Integrated driveline synchronization and AWD controls
- Available automatic disconnect controls
- Enhanced vehicle handling
- Cross axle lock capability for enhanced traction
- Available driveline disconnect variant for improved fuel economy
Rear-Wheel Drive/All-Wheel Drive


- Pre-emptive and immediate response
- Position-stable lock mode and active oil sump management
- Available driveline disconnect and range shift-on-the-move variants

- Pre-Emptive On-Demand Transfer Case
- Torque-On-Demand® Transfer Case
- Front Axle Disconnect Actuator

- Best-in-class electro-magnetic mode synchronization
- Electronic or manual shift on-the-fly
- Low drag torque for optimum two-wheel drive fuel economy

- Part-Time Transfer Case
- Heavy Duty Part-Time Transfer Case
- Full-Time Transfer Case

- Large center distance architecture
- High-capacity electro-magnetic mode synchronization
- Class-6 capability

- Advance planetary gear design for optimum NVH performance
- Wide range of center differential torque distribution options
- Available limited-slip center differential options
Cross Axle Systems

Cross-axle technologies enhance vehicle traction and handling on front-wheel drive and rear-wheel drive applications ranging from electronic limited-slip differential control to full-function torque vectoring systems.

Hybrid and Electric Drive

Primary and secondary electric drive technologies for pure electric and full hybrid vehicle applications ranging from single-speed to fully-integrated axle systems as well as 48V based HEV systems.

Front and Rear eLSD Systems

- Enhanced vehicle traction and handling
- Reduced brake-based system interventions
- Modular design for ease of vehicle integration

Through-the-road HEV systems (eAWD)

Hybrid Drive Systems

- 48V-based torque-vectoring drive systems
- Advanced stop/start, regen and boosting systems

Compact Torque Vectoring

- Superior full-function vehicle handling and dynamics
- Compact and light weight design
- Single side-mounted modular layout for cost effective integration

High efficiency helical geartrain

Electric Drive Transmissions

- Wide range of gear reduction ratios and installation drop angles
- Electronically actuated park lock system
Controls and Vehicle Integration

Proven electro-hydraulic, -magnetic, and -mechanical actuated system development and production launch including control algorithms, software, ECU hardware, systems integration and vehicle calibration.

Vehicle Integration

- Wide range of driveline system development and integration experience
- Powertrain integration including hybrid drive system controls
- Proficient with ESC/TCS/ABS vehicle controls and various powertrain system interactions
- Complete vehicle instrumentation, evaluation and calibration capabilities

Software Development

- Development process according to SPICE, CMMI and ISO 26262
- Modular layered architecture for high application reuse and robustness
- Auto code generation for rapid product development
- MIL/SIL/HIL test capabilities with focus on automated testing and re-use

Controls and Vehicle Dynamics

- Full range of enhanced vehicle traction and handling algorithms
- System modeling and simulation environments for rapid development and implementation
- Model based development for rapid prototyping and development

Electronic Control Unit (ECU)

- Supports wide range of environmental requirements from integrated to in-cabin
- Scalable micro controllers including 16/32 bit, fixed and floating point
- Off-the-shelf solutions or to customer specific requirements supporting CAN and FlexRay
- Power Electronics specification and integration capabilities