



Partner Projects

Electrification Energizes Formula 1 Racing

Customer

Only a handful of Constructors are certified to build cars intended for Formula 1 racing. The Constructors rely heavily on a seasoned supplier base having the specialized knowledge and domain expertise necessary to develop solutions capable of providing ultra-high performance combined with the reliability required to survive the rigors of the world's most competitive sport. One such supplier provides Energy Recovery Systems (ERS) that recover waste energy expelled as part of the engine exhaust gas, as well as heat energy generated during heavy braking, and converts it to electricity for later use during acceleration.

Application

To address increasing concern among racing fans about energy efficiency and the environment, Formula 1's governing body changed the required engine configuration from normally aspirated V8 engines to V6 turbos. While Kinetic Energy Recovery Systems (KERS) had been used since 2009, recovering the thermal exhaust gas energy would be necessary to close the horsepower gap between the V6 turbo and its predecessor.

Challenge

Permanent magnet DC motors and generators provide the high power density and performance necessary for Formula 1 ERS. Since turbochargers

operate at very high speeds (often in excess of 60,000RPM), and higher speed equates to higher efficiency, a new magnet retention system was necessary to secure the magnets to the rotor at speeds in excess of 100,000RPM.

Solution

Windings worked closely with the ERS supplier to develop a magnet retention system that would reliably secure the magnets to the rotor at the desired speed while operating in a high heat and vibration environment.

Results

The Windings-supplied retention system has been in use for over 9 seasons of racing across several Formula 1 race teams without a single race failure.

Windings

For more than 20 years, Windings has helped pioneer the development of electromagnetic solutions that support the electrification of motor vehicles. From hybrid / electric passenger cars and commercial vehicles to Formula 1 racing, Windings has partnered with Automotive industry leaders to engineer, optimize and manufacture custom electric motors, generators and related components including rotors, stators, lamination stacks and insulation systems.

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